News about

B. F. Goodrich Chemical *raw materials*

Good-rite
Reg. U.S. Pat. Off.

VULTROL

good cure for scorch problems

Vultrol gives you good protection against scorching in compounding natural and GRS rubbers. It is an efficient retarder at processing temperatures, a mild activator at curing temperatures.

Vultrol is a particularly effective ingredient in compounds loaded with high abrasion furnace blacks, and offers advantages with many other highly loaded and highly accelerated compounds.

Vultrol is very effective in recovering aged uncured, scorched, or bin cured stocks. It prevents further scorch during processing of these stocks, and does not interfere with their final cures.

Good-rite *Vultrol* requires no special handling, is supplied as a free-flowing flake. It is economical and easy to use. For complete information, please write Dept. CJ-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Good-rite
Reg. U.S. Pat. Off.
Rubber Chemicals

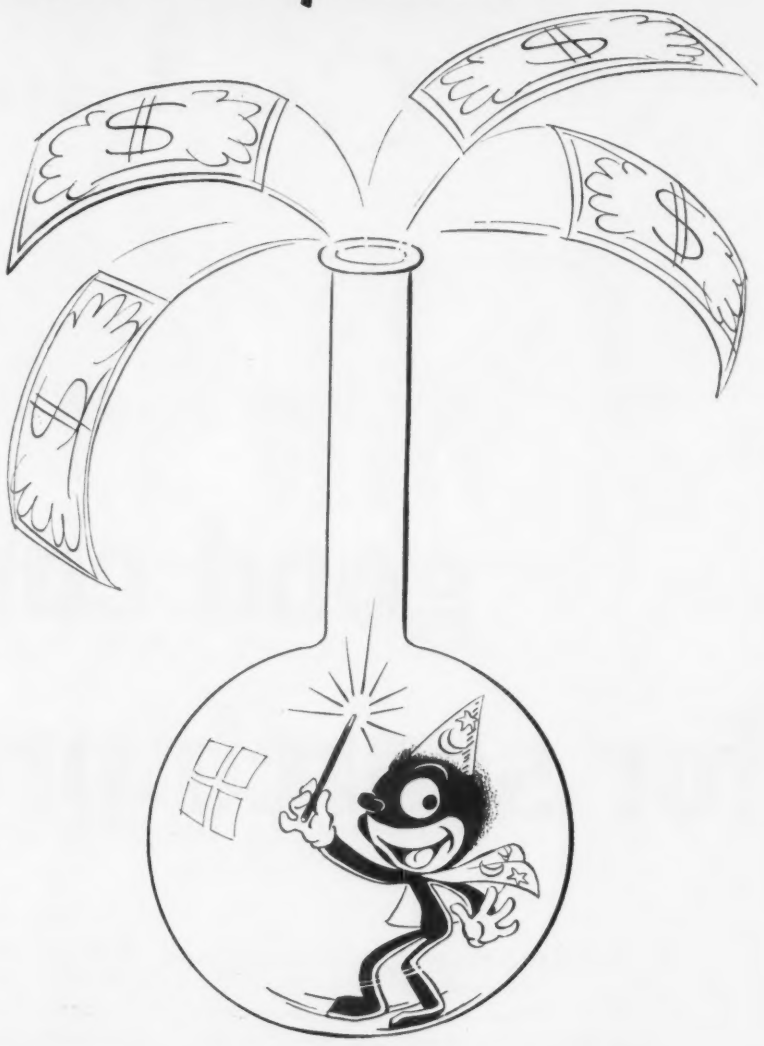
GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

PHILBLACK® PETROCHEMISTRY turns rubber into profits!

Philblack scientists have come up with some near-magic formulas for transmuting rubber into bigger profits! For example, Philblack research has discovered procedures that make processing easier and faster. Your saving in time and trouble is clear gain!

Philblack makes rubber products look better, wear better, *sell better!* Philblack makes tires wear longer . . . run cooler. The proper Philblack gives rubber products high hot tensile, longer flex life, or almost any quality you desire.

If you have problems concerning rubber processing or products, take advantage of Philblack experience and the resources of our modern testing laboratories. Just consult your Philblack technical representative.



Know the Philblacks!

KNOW WHAT THEY'LL DO FOR YOU!

A **Philblack A FEF Fast Extrusion Furnace Black**
Ideal for smooth tubing, accurate molding, satiny finish. Mixes easily. High, hot tensile. Disperses heat. Non-staining.

O **Philblack O HAF High Abrasion Furnace Black**
For long, durable life. Good electrical conductivity. Excellent flex. Fine dispersion.

I **Philblack I ISAF Intermediate Super Abrasion Furnace Black**
Superior abrasion resistance at moderate cost. Very high resistance to cuts and cracks. More tread miles at high speeds.

E **Philblack E SAF Super Abrasion Furnace Black**
Toughest black on the market. Extreme abrasion resistance. Withstands aging, cracking, cutting and chipping.

Phillips 66

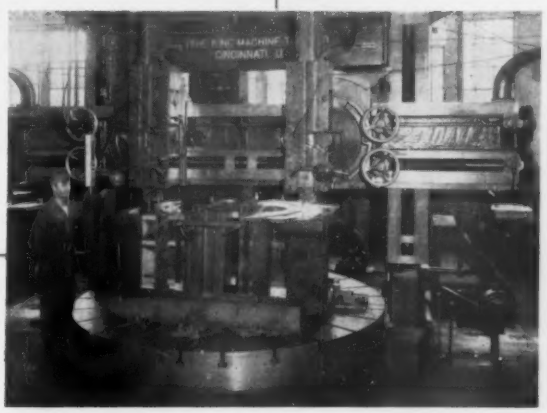
PHILLIPS CHEMICAL COMPANY, Rubber Chemicals Division, 318 Water St., Akron 8, Ohio. Export Sales: 80 Broadway, New York 5, N. Y. West Coast: Harwick Standard Chemical Company, Los Angeles, California. Canada: H. L. Blachford, Ltd., Montreal and Toronto.

FACILITIES

. . . an important factor in the S.C.S.* Method of Rebuilding BANBURY MIXERS

SECO
ESTABLISHED 1868

* S.C.S. means Skinner Certified Service. One important factor in the rebuilding of Banbury Mixers is the proper equipment to do what needs to be done, with dispatch and precision. Expert craftsmen use the most improved machine tools for turning, boring, milling, and other necessary operations. Searching inspection and rigid testing are routine procedures throughout the rebuilding job.



Re-cutting registers and restoring standard length dimension for No. 11 spray sides on 120-in. King Vertical Mill. This is one of the large heavy duty machine tools in the SKINNER plant used in rebuilding Banbury Mixers.

A *few* POINTERS ON S. C. S.

- All rebuildable parts of dismantled body are checked for hidden imperfections, for standard dimensions and distortion.
- Sides are bored out, and 2-in. liners of customer's choice installed.
- Rotors are completely stripped of hard-surfacing materials, and bodies rebuilt to proper contour. Entire rotor, inclusive of threads, is rebuilt, body hard surfaced, stress relieved, and restored to standard dimensions.
- Sliding door, dust seal rings, and body fit bolts are always provided new.
- All parts are carefully examined by skilled technicians and magnafluxed.

SKINNER · ENGINE · COMPANY

SECO ESTABLISHED 1868

RUBBER MACHINERY DIVISION
TELEPHONE ERIE 2-3661
ERIE 6 · PENNSYLVANIA

Capitalize on your Calender

with postformable sheets of new **Plio-Tuf C75**

HERE'S one way to squeeze more profits out of existent equipment: Capitalize on the booming, postforming market by calendering wide sheets of new PLIO-TUF C75.

It is estimated that 20,000,000 pounds of resin were consumed by the sheet forming industry in 1954. It is predicted that this consumption will soar to 200,000,000 pounds by 1960.

A high proportion of the resins used for rigid sheets is of the styrene type. And that's where PLIO-TUF C75 comes into your picture.

PLIO-TUF C75 is a brand-new, modified styrene resin—specifically designed for the calendering of sheets. It is an internally reinforced resin offering decided advantages over similar materials. It is a resin that will enable you to make a premium profit product on existent equipment.

The outstanding features of PLIO-TUF C75 are its high resistance to impact, particularly at low temperatures, coupled with its unusual resistance to distortion by heat and excellent stiffness. Moreover, the light color, low specific gravity and warmth of PLIO-TUF C75, plus its excellent abrasion-, chemical-, electrical- and age-resistance, give it properties equal or superior to similar sheet forming resins.

Why not learn more about how you can make the most of your calender with PLIO-TUF C75? Samples and technical help are yours by writing to:

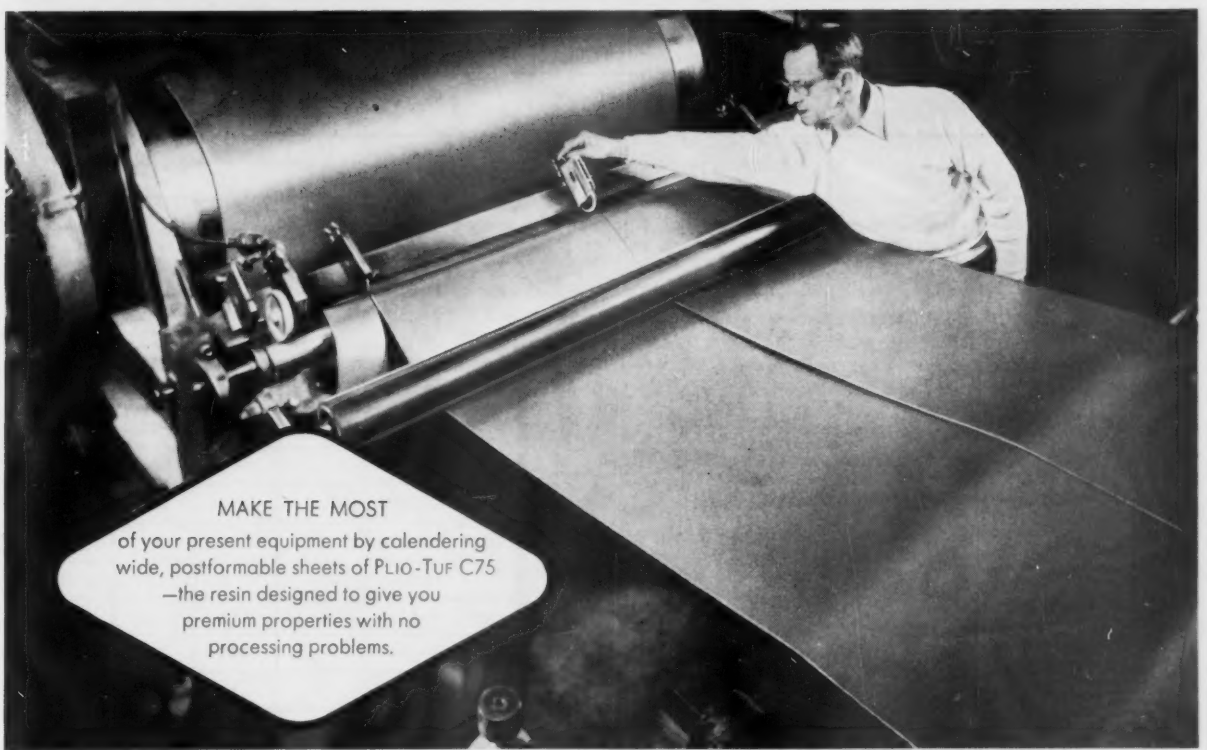
Goodyear, Chemical Division, Akron 16, Ohio

CHEMICAL GOODYEAR DIVISION

Chemigum, Pliobond, Plioflex, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

The Finest Chemicals for Industry—CHEMIGUM · PLIOBOND · PLIOFLEX · PLIOLITE · PLIO-TUF · PLIOVIC · WING-CHEMICALS

PLIO-TUF C75 . . . another quality product of Goodyear Chemical Division


MAKE THE MOST
of your present equipment by calendering wide, postformable sheets of PLIO-TUF C75 —the resin designed to give you premium properties with no processing problems.

Photos courtesy Plymouth Rubber Company, Inc., Canton, Mass.

AKTONE Gives Unequalled Storage Stability for GRS Camelback Stock

Physical Properties—UNAGED—Cure=60' @ 300° F.

Recipe	Modulus @ 300%	Tensile	Scorch (min.)
1	1550	3000	34
2	1200	2700	29
3	1490	2460	28

Physical Properties—AGED—6 and 12 weeks @ 118° F. before curing

Recipe		Modulus @ 300%	Tensile	% Depreciation
1	6 weeks	1310	2950	− 1.6
	12 weeks	1200	3030	+ 1.0
2	6 weeks	1060	2550	− 5.5
	12 weeks	1000	2650	− 1.9
3	6 weeks	1300	2480	+ 0.8
	12 weeks	1120	2500	+ 1.6

AKTONE provides the improved storage stability needed in camelback. You will also find AKTONE excellent for use as a general purpose activator. It is outstanding in stocks made from blends of GRS and natural rubber. Write for your working sample today.

Recipes	1	2	3
GRS-1500*	100.0	50.0	50.0
GRS-1712**	–	68.75	68.75
AROMEX ISAF	45.0	53.5	62.75
Zinc Oxide	5.0	5.0	5.0
Antioxidant	.5	.5	.5
Stearic Acid	1.5	1.5	1.5
Softener	12.0	12.0	15.0
Sulfur	1.8	1.85	1.85
MBTS	.75	.90	.90
AKTONE	.75	.90	.90

*cold rubber **oil-extracted rubber

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CARBON BLACKS • RUBBER CLAYS • RUBBER CHEMICALS

Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

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Balata—Its Production, Possibilities and Uses—*By Lillian Cook* 872

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The Reinforcement of Butyl and Other Synthetic Rubbers with Silica Pigments. Part I—Effect of Heat Treatment —*By A. M. Gessler and John Rehner, Jr.* 875

Description of methods which eliminate the excessive vulcanizate stiffness associated with the use of silicas. The methods are shown to yield vulcanizates with tensile strength, modulus and abrasion resistance comparable to others.

Petroleum Waxes for Protecting Rubber Compounds from Cracking: The Relative Merits of Ozone Exposure Testing and Natural Aging of Rubber—*By Paul D. Sharpe* 884

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•

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Microfilm copies of complete volumes of RUBBER AGE are available from: University Microfilms, 313 North First St., Ann Arbor, Mich.

Indexed in Industrial Arts Index and Engineering Index

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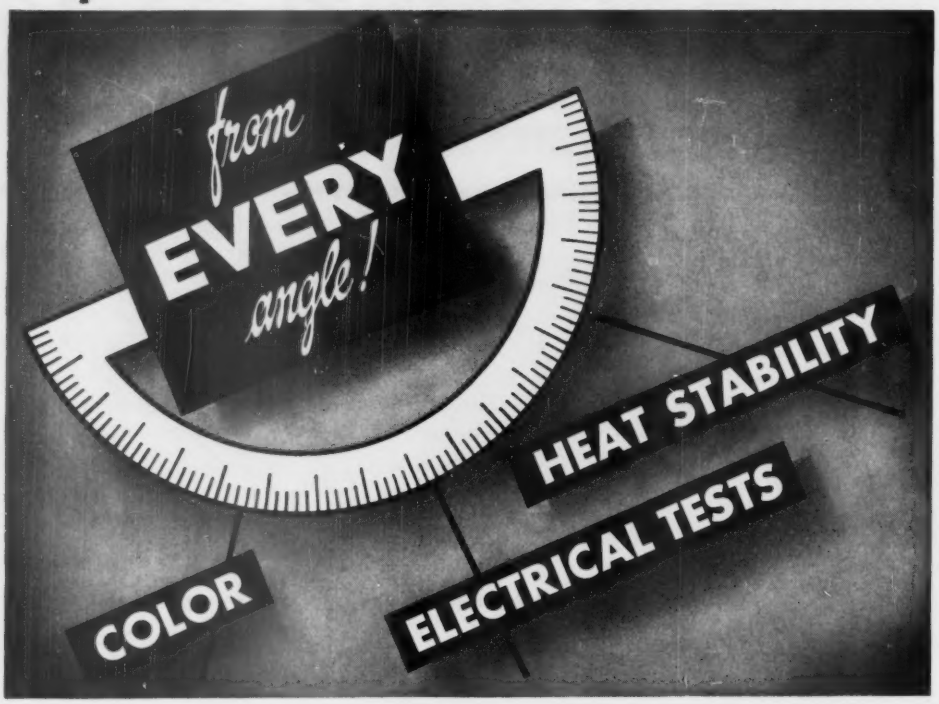


PIGMENT NO. 33

for Compounding

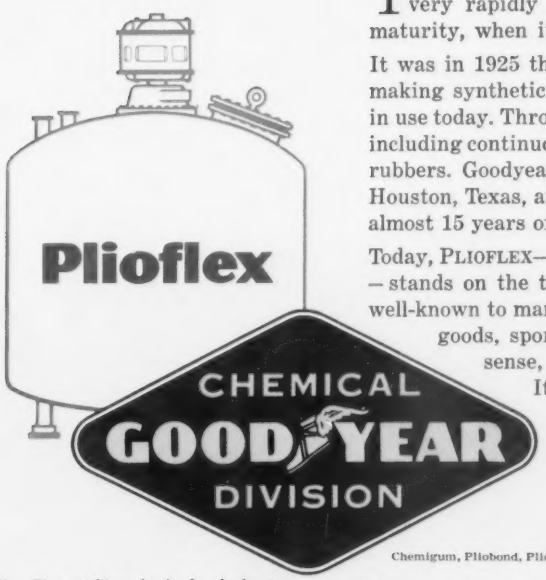
VINYLS AND SYNTHETIC RUBBER

Sample and technical data sent promptly on request

SOUTHERN CLAYS, Inc.

33 RECTOR STREET
NEW YORK 6, N. Y.

This new product is nearly 30 years old!



YOU might say it was born in 1925. It grew slowly at first, but then very rapidly under government sponsorship. This year it reached maturity, when it became PLIOFLEX—Goodyear Synthetic Rubber.

It was in 1925 that Goodyear began work leading to its first patent on making synthetic rubber by emulsion polymerization—the basic process in use today. Through the years, Goodyear pioneered many other advances including continuous polymerization, oil extended rubbers and nonstaining rubbers. Goodyear also put the first Government plant in operation at Houston, Texas, and operated another plant in Akron, Ohio, accumulating almost 15 years of large-scale manufacturing experience.

Today, PLIOFLEX—a family of primarily nonstaining, styrene-type rubbers—stands on the threshold of a great future. Its outstanding quality is well-known to many processors of shoe soles, flooring, wiring, mechanical goods, sporting goods, sundries and other rubber products. In a sense, PLIOFLEX is an old friend embarking on a new career. It already has made substantial progress—even more is assured by the years of experience behind it.

Further information in the free, 24-page brochure "PLIOFLEX Rubber," is yours by writing, on company letterhead, to: Goodyear, Chemical Division, Dept. I-9419, Akron 16, Ohio.

Chemigum, Pliobond, Plioflex, Pliolite, Plio-Tuf, Pliovic —T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

The Finest Chemicals for Industry — CHEMIGUM • PLIOBOND • PLIOFLEX • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS

Our Golden Anniversary

Experience from the Past

Progress for the Future

United Clay Mines
CORPORATION

Trenton, New Jersey

Newest of the New!

TY·PLY®

New UP-BC ADHESIVE SYSTEM

for vulcanized bonding of BUTYL rubbers to metals

TY-PLY UP — the universal Primer, and TY-PLY BC, the Butyl Cover Cement, give exceptional bonds of Butyl compounds to metals regardless of cure system or type and amount of filler.

TY-PLY BC alone is an excellent adhesive for the vulcanized bonding of cured and uncured Butyl rubbers to various types of elastomeric compounds.

TY-PLY "UP-RC"
the two coat Adhesive System for bonding Natural Rubber and GR-S Compounds

TY-PLY "Q" or "3640"
the single coat Adhesive for bonding Natural and GR-S compounds

TY-PLY "BN"
for bonding N-types

TY-PLY "S"
for bonding Neoprene

TY-PLY will adhere most vulcanizable rubber compounds to almost any clean metal surface

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Division of BORG-WARNER
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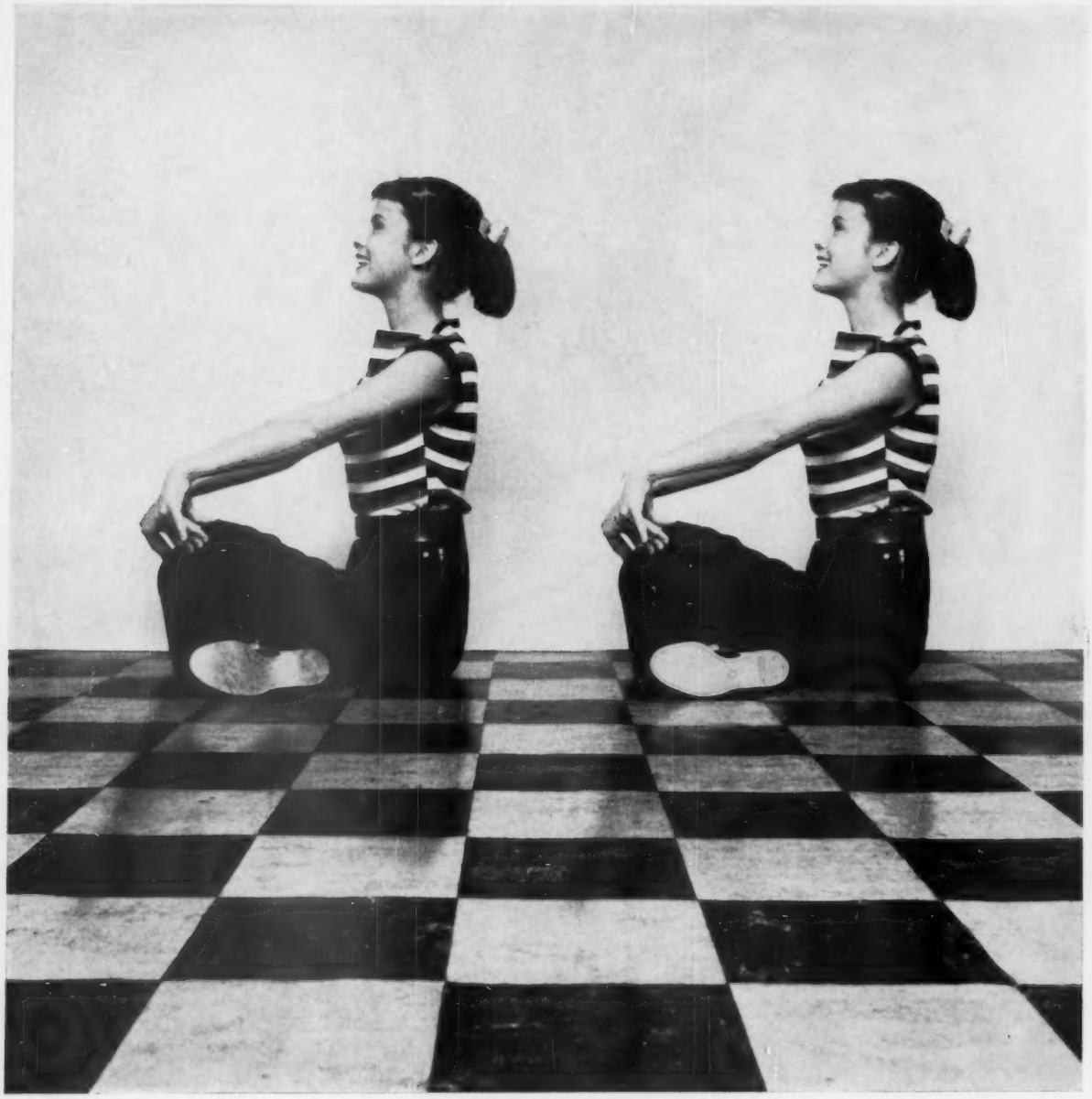
TY-PLY has stood the test of time . . . since '39



Which sole has the SOLKA-FLOC®?

It's the sole that stays flat—holds its shape. And it makes a direct appeal to mothers who are constantly faced with the problem of teen-age wear.

Solka-Floc is the reason. It gives the necessary dimensional stability to flexible rubber soles, floor tile, and like products. Besides . . .

It reduces blistering and nerve, improves dispersion, controls shrinkage, permits sharper designs and harder, smoother surfaces.

A finely divided, highly purified wood cellulose, Solka-Floc speeds production, gives your product zip and appeal and is economical to use.

Let us show you how it can solve your specific process problems. Outline them in a letter to Technical Service, Dept. FG-9, Boston office.

BROWN QUALITY

COMPANY, Berlin, New Hampshire

General Sales Office:
150 Causeway Street, Boston 14, Mass.

SOLKA PULPS • SOLKA-FLOC • NIBROC PAPERS
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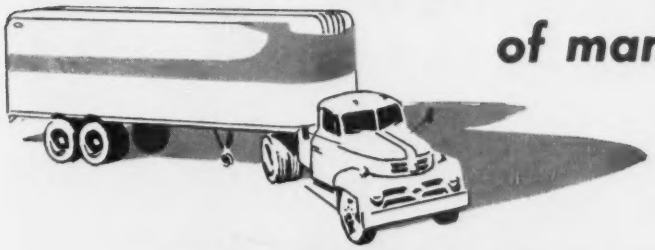
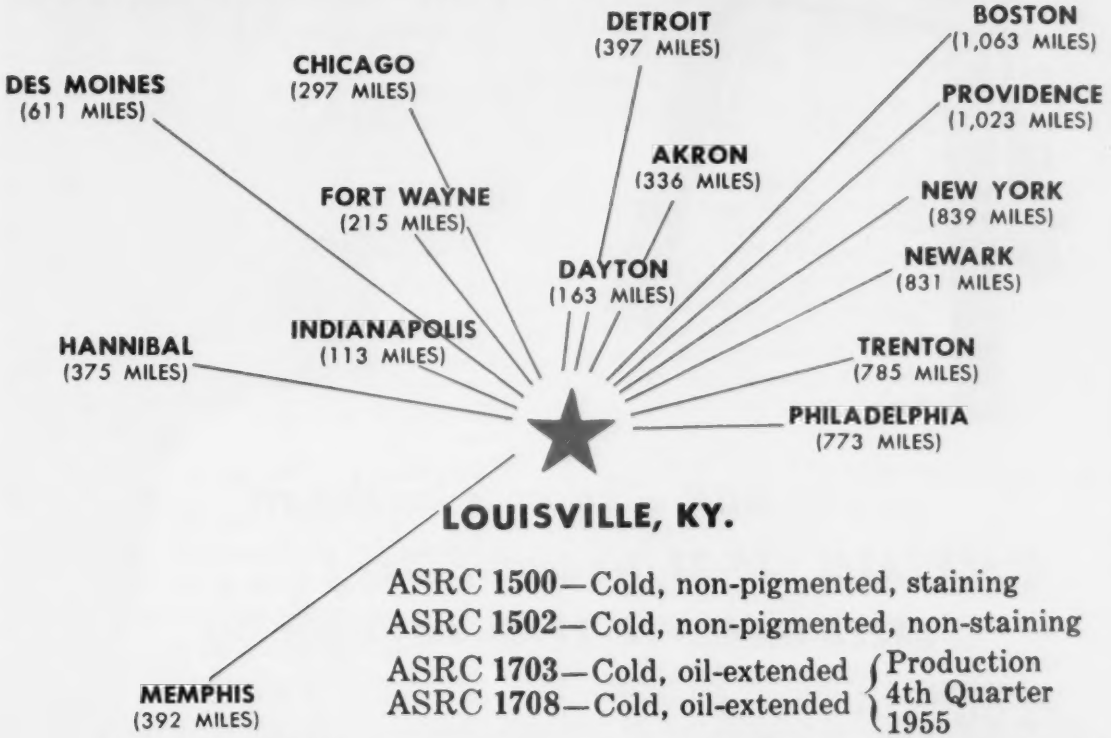


of many key points . . .

AMERICAN SYNTHETIC RUBBER CORP.

located at the "Hub" of the rubber market



ASRC **1500**—Cold, non-pigmented, staining
ASRC **1502**—Cold, non-pigmented, non-staining
ASRC **1703**—Cold, oil-extended } Production 4th Quarter 1955
ASRC **1708**—Cold, oil-extended }

Selective types of the one thousand series late 1st quarter 1956.

American Synthetic Rubber Corp.

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In every test—St. Joe coated ZnO scores higher!

for better dispersion in less time use

***BLACK LABEL #20-21** Fine Particle Size*

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PLANT & LABORATORY, MONACA (JOSEPHTOWN) PA.

Announcing VA-7

... an economical vulcanizing agent for heat-resistant, non-blooming stocks

VA-7 is a new liquid vulcanizing agent for all types of unsaturated elastomers. It provides economical "sulfurless" cures for nitrile, GR-S and natural rubber stocks.

Stocks compounded with VA-7 display an outstanding combination of heat aging resistance . . . . high tensile strengths . . . . good hot compression set resistance . . . . and non-blooming characteristics in the cured and uncured states.

VA-7 also offers processing advantages—it can be dispersed more easily and uniformly than sulfur. Stable emulsions for curing latices can easily be prepared from VA-7.

The moderate price of VA-7 is another feature that makes this product worth your investigation. *Try VA-7 for heat-resistant, non-blooming stocks at reasonable cost!*

For compounding information and a sample of VA-7 fill out and mail the handy coupon.

CHECK LIST OF VA-7 PROPERTIES

Outstanding heat aging resistance
Non-blooming in cured or uncured state
High strengths at low concentrations
Easy and uniform dispersion
Good hot compression set
Moderate price

THIOKOL CHEMICAL CORPORATION
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Please send me compounding information ☐
and a sample of VA-7 ☐

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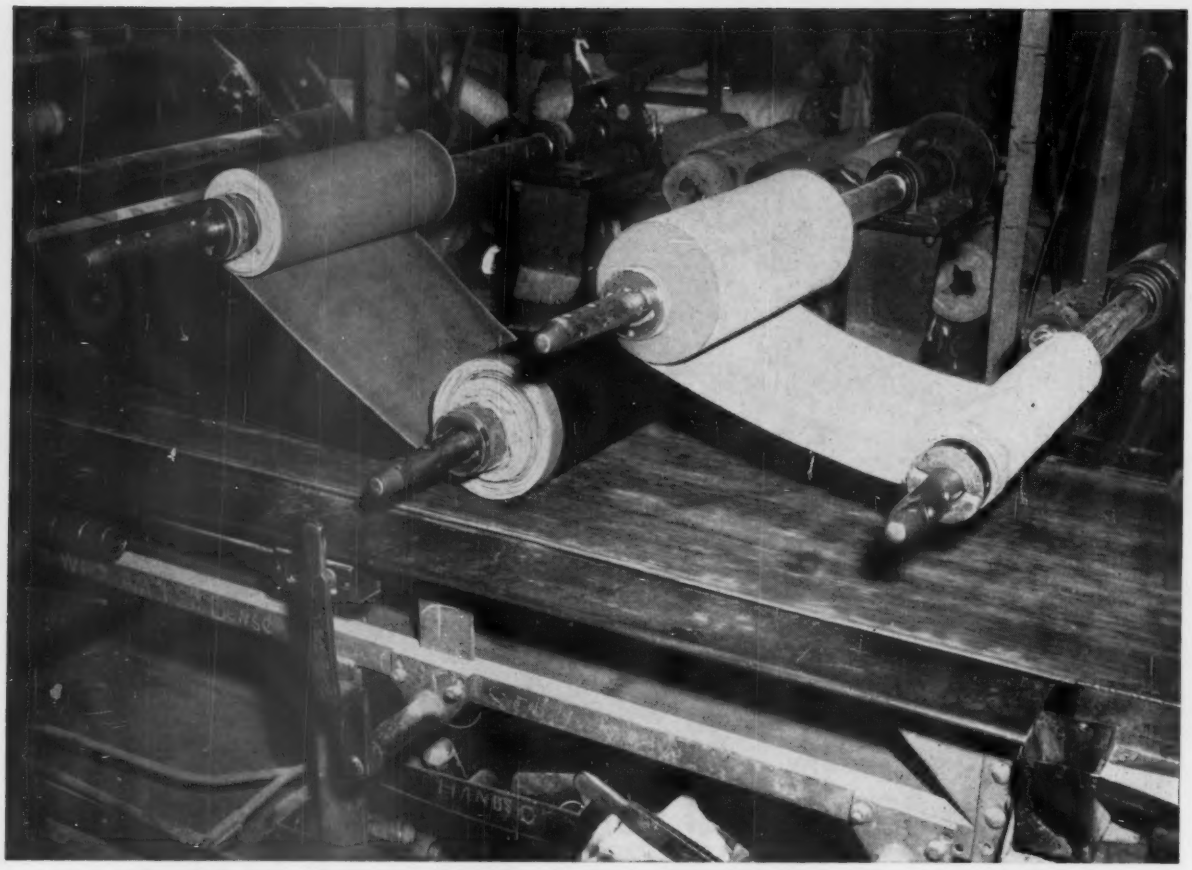


CLIMCO PROCESSING—

To Prevent Sticking

At the bias cutter, cut bands will not stick if they are rolled into liners.

Besides preventing adhesions, Climco Processed Liners help all along the line to eliminate tie-ups that cost production time and money. Lint and ravelings, air, moisture, sunlight are excluded—oxidation, mold and bloom are prevented. Tackiness is preserved.

Labor and power are saved, stock losses are reduced and accurate gauges are maintained more easily. Latitude in compounding is enlarged.

For over 31 years, Climco Processed Liners have been used to protect stocks and take the "kinks" out of production lines. Give Climco Processed Liners a trial in your plant.

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Ave. • Cleveland 27, Ohio

GET THE FULL STORY ON CLIMCO PROCESSING

Illustrated booklet tells about Climco Liners and Linerette separating paper. Tells how to get better service from liners. Write for your copy now.

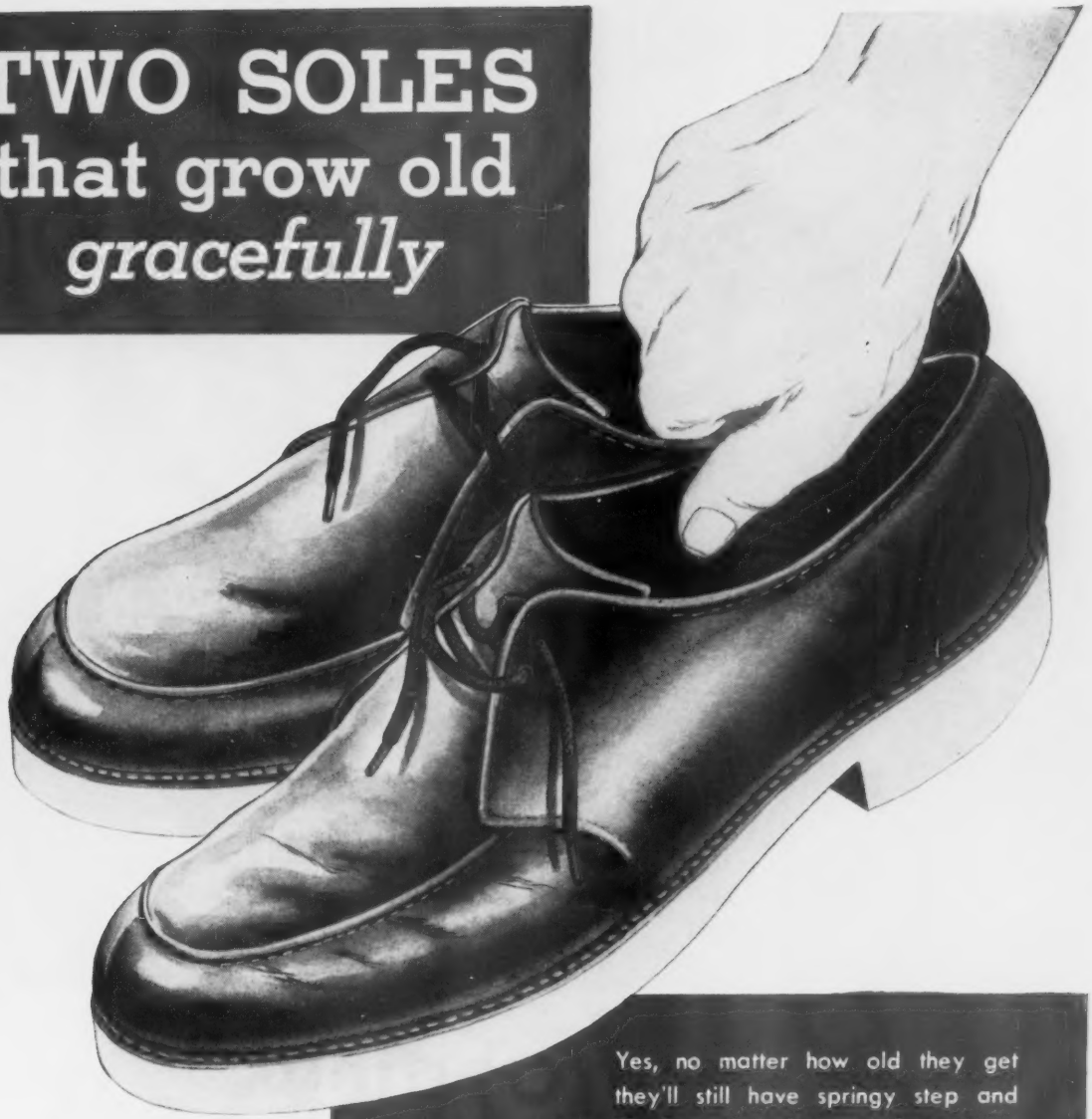
LINERETTE INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO
PROCESSED LINERS

FOR FASTER, BETTER PRODUCTION AT LOWER COST

THE CLEVELAND LINER & MFG. CO. CLIMCO CLEVELAND, OHIO, U.S.A.

TWO SOLES that grow old *gracefully*



Yes, no matter how old they get they'll still have springy step and longer life. Because today, manufacturers of quality footwear use Neville Resins in compounding synthetic soles and heels, thus improving the properties of their product. They get abrasion resistance, flex-life, high tensile strength and uniform quality in the stock they use.

- *These advantages are obtainable with Neville Resins in processing other rubber products too, such as molded goods, mats, floor tile, wire insulation and mechanical goods in general!*

NEVILLE RESINS

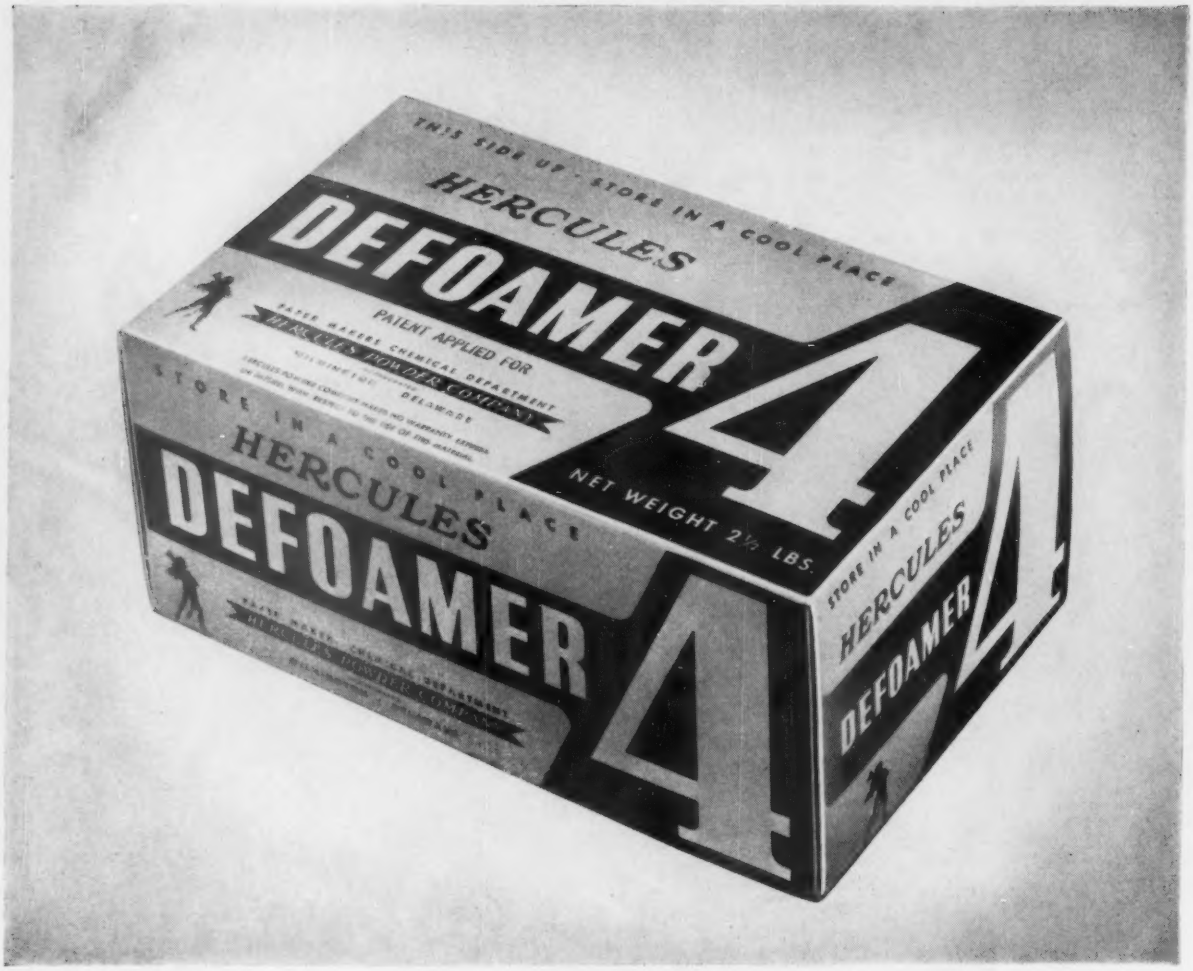
Call us for samples and information

NEVILLE CHEMICAL CO.

PITTSBURGH 25, PA.

Plants at Neville Island, Pa. and Anaheim, Cal.

R-54



THIS HANDY BRICK DOES THE TRICK

Weighing only 2½ pounds, a brick of Hercules® Defoamer 4 can make up to 40 gallons of highly effective foam control solution. It can be applied at any stages during removal of unreacted butadiene, and in the stripping column for recovery of styrene—wherever foam occurs in GR-S manufacture.

The convenience of the brick form means no waste, no mess, and no heavy drums to handle or ship. We will be glad to send you a sample brick for evaluation under your own production conditions.

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PMC Department
HERCULES POWDER COMPANY
INCORPORATED
918 Market St., Wilmington 99, Del.

HEADQUARTERS FOR HYDROPEROXIDES AND EMULSIFIERS FOR POLYMERIZATION PR55-1

One of a series of famous trails.

The California Trail

Discovery of gold at Sutter's Mill in 1848 sent thousands westward. From every part of the nation and from overseas the adventurous raced to the California foothills to seek their fortune. Overland the journey followed the way earlier made by the Oregon settlers and the Mormons. Near the Snake River the trails parted, the California Trail swinging south to the gold fields.

Bennett Clark, of Booneville, Mo., wrote in his journal: "We saw the dust ascending to the skies, shewing that every avenue to the golden region was crowded with eager travellers to the Great El Dorada." Near the locality called City of Rocks, where the foregoing was written, Pegleg Smith, an old mountain man, saw the uncrowded days of the west which he once knew come to an end as he watched the gold seekers in an endless stream pass his cabin on Bear River.

A motorist on US 40, which follows part of the route of the old trail, cannot possibly realize the incredible hardships which the gold seekers endured. Where he today rides in comfort, the Forty Niners suffered from the relentless heat and the lack of water, and were in constant danger from the Indians.

California is a mecca for the tourist. The products of its land and factories roll forth every hour of the day, headed for the great markets to the eastward, their value far greater than the gold which lay in its streams and in its mountains.

How far man has progressed in his ability to transport himself and his goods. Neither the heat of the waterless desert nor the cold of the snow-filled mountain passes, nor the ruggedness of the terrain, restrain him in his journeys. The rubber tire takes him swiftly on his way.

The long-wearing qualities of the rubber tire are obtained from carbon black, which imparts durability. United Blacks, distributed throughout the world, are among the best in quality and performance, constantly developed to meet needs of the tire industry.

UNITED CARBON COMPANY, INC.

Kosmos 70, intermediate super abrasion (ISAF), is the finest quality furnace carbon black for natural and synthetic rubbers. It imparts maximum strength and extreme resistance to wear. It is also safe processing.

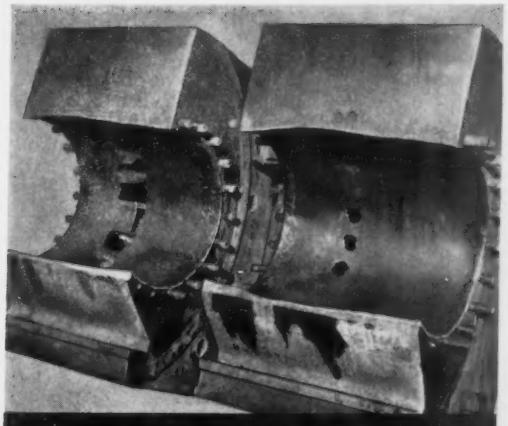
Kosmos 70 is a must for the better type passenger, truck, and tubeless tires and for tank tracks. It assures them phenomenal endurance and a long mileage record. Mechanical goods likewise draw on Kosmos 70.

Kosmos 70 and related Kosmos brands are key blacks with rubber compounders. They know by experience. Standardize on United Blacks to forge ahead.

UNITED CARBON COMPANY, INC.

CHARLESTON 27, WEST VIRGINIA

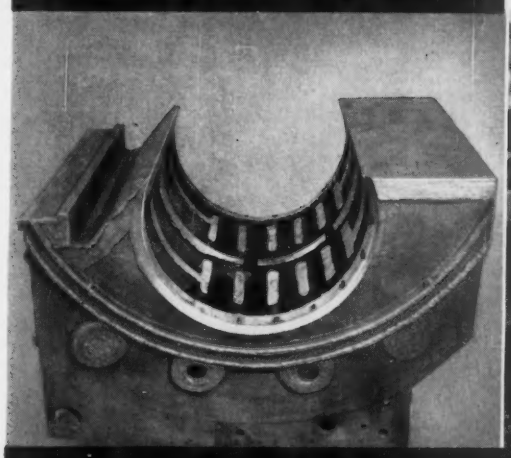
NEW YORK AKRON CHICAGO BOSTON MEMPHIS



Badly worn Banbury sides returned for rebuilding.

EVIDENCE

that it pays to have your Banbury® repairs done by Farrel-Birmingham



Side has been bored, ready for a wear-resistant liner to be welded in.

New liner getting final gauging after having been finished to exact size.

As you can see from these photos, Farrel-Birmingham can salvage badly worn Banbury mixer sides by boring, and then welding in new, extremely wear-resistant, special-alloy liners, which are finished to exact final dimensions. When rebuilt, the side is as good as new and carries the same guarantee.

To keep your Banbury shutdown to a minimum, exchanges of bodies can be handled in either of two ways:

1. For fastest service you can "swap" your worn Banbury body for a new one out of Farrel-Birmingham stock. We carry large stocks of new bodies at our Buffalo plant for shipment to western points and at our Derby plant for shipment to eastern points.
2. When you can plan your shutdown period a sufficient time ahead, we can reserve for you a rebuilt body from the number that is continually "in process" at our Derby plant.

When you need Banbury repairs or rebuilding, make sure you get the kind of job that will give you new Banbury performance. Call the Farrel-Birmingham office nearest you.

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ANSONIA, CONN., (REgent 4-3331)
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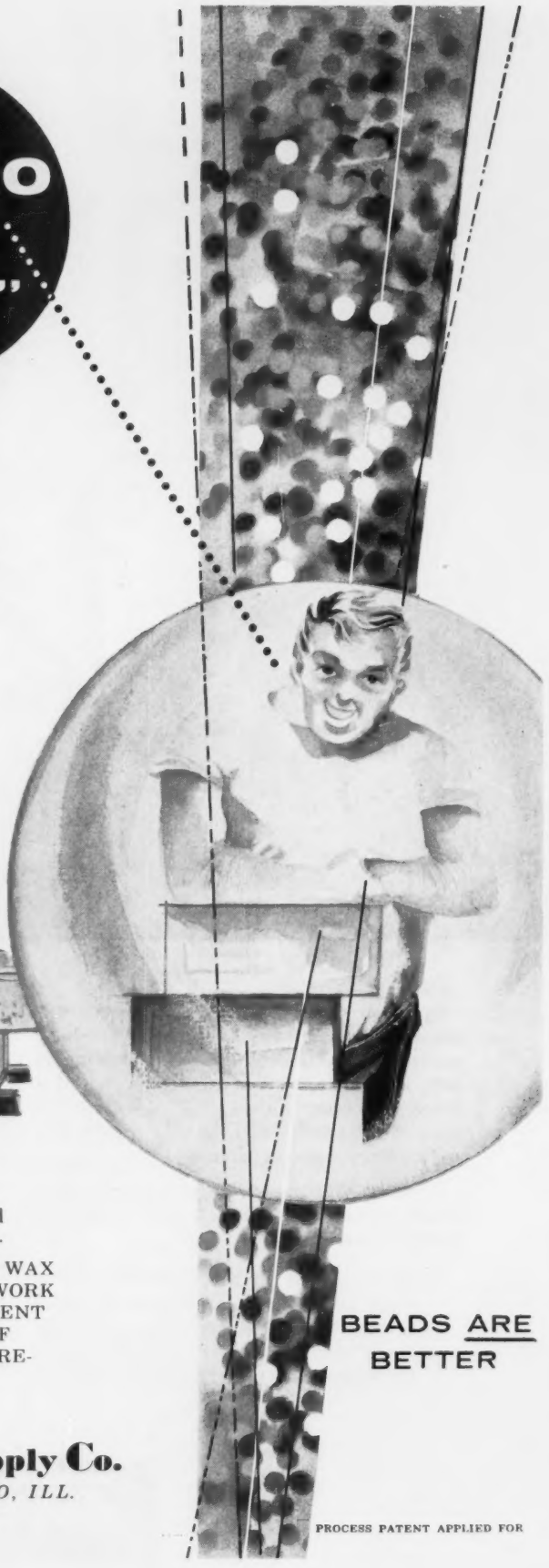
Farrel-Birmingham®

"IT'S A

PLEASURE

TO WORK WITH

DETERO WAX BEADS"



"I like Detero Wax because—

IT POURS easily—no messy flakes—will not stick in hot weather or hot mill rooms. Handles much more easily!

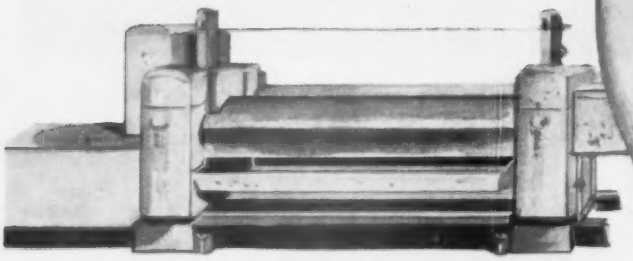
IT MEASURES so easily and quickly—no "approximate" weights!

IT DISPERSES easily and uniformly—cuts mixing time!"

A message to the man who BUYS the wax at your plant:

The man who *uses* DETERO WAX *likes* it because it makes his job easier—*but* DETERO WAX makes the product better, too.

Detero Wax has been tried and tested in rubber formulations, and has been proven to give superior protection against weather and ozone.



Specific wax blends for unusual rubber formulations can be beaded according to your specifications.

Blended DETERO WAX BEADS *speed* and *improve processing* and *improve the product.*

We have also developed special DETERO WAX BEADS for VINYL PLASTICS. LET US WORK WITH YOU—TO *IMPROVE* YOUR PRESENT PRODUCTS or in the DEVELOPMENT OF NEW PRODUCTS FOR SPECIAL REQUIREMENTS OR CONDITIONS.

BEADS ARE BETTER

PROCESS PATENT APPLIED FOR

American Maintenance Supply Co.

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How long did it take...
to get from here...to here?

ANSWER: 25 YEARS

With the introduction of hot water heaters in 1926 cars, motorists were beginning to roll in solid comfort during cold winter months. But research and development didn't stop there. Since 1951, air conditioning, at the touch of a button, provides year-'round spring temperatures despite weather extremes.

At the same time, the rubber industry was discovering new ways of making its products more versatile and longer lasting. Monsanto has played an important role in this development with its increasing number of rubber chemical products.

For example, Santocure NS, the newest Monsanto accelerator of the sulfenamide type, is characterized by even more delayed action, greater strength and full activity at curing temperatures. As an analogue of regular Santocure it is designed to meet the needs of present-day high-speed production which involves high processing temperatures.

For your copy of catalog "Chemicals for the Rubber Industry," write MONSANTO CHEMICAL COMPANY, Rubber Chemicals Dept., 920 Brown St., Akron 11, Ohio.

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MERCAPTO ACCELERATORS
Santocure* NS
Santocure
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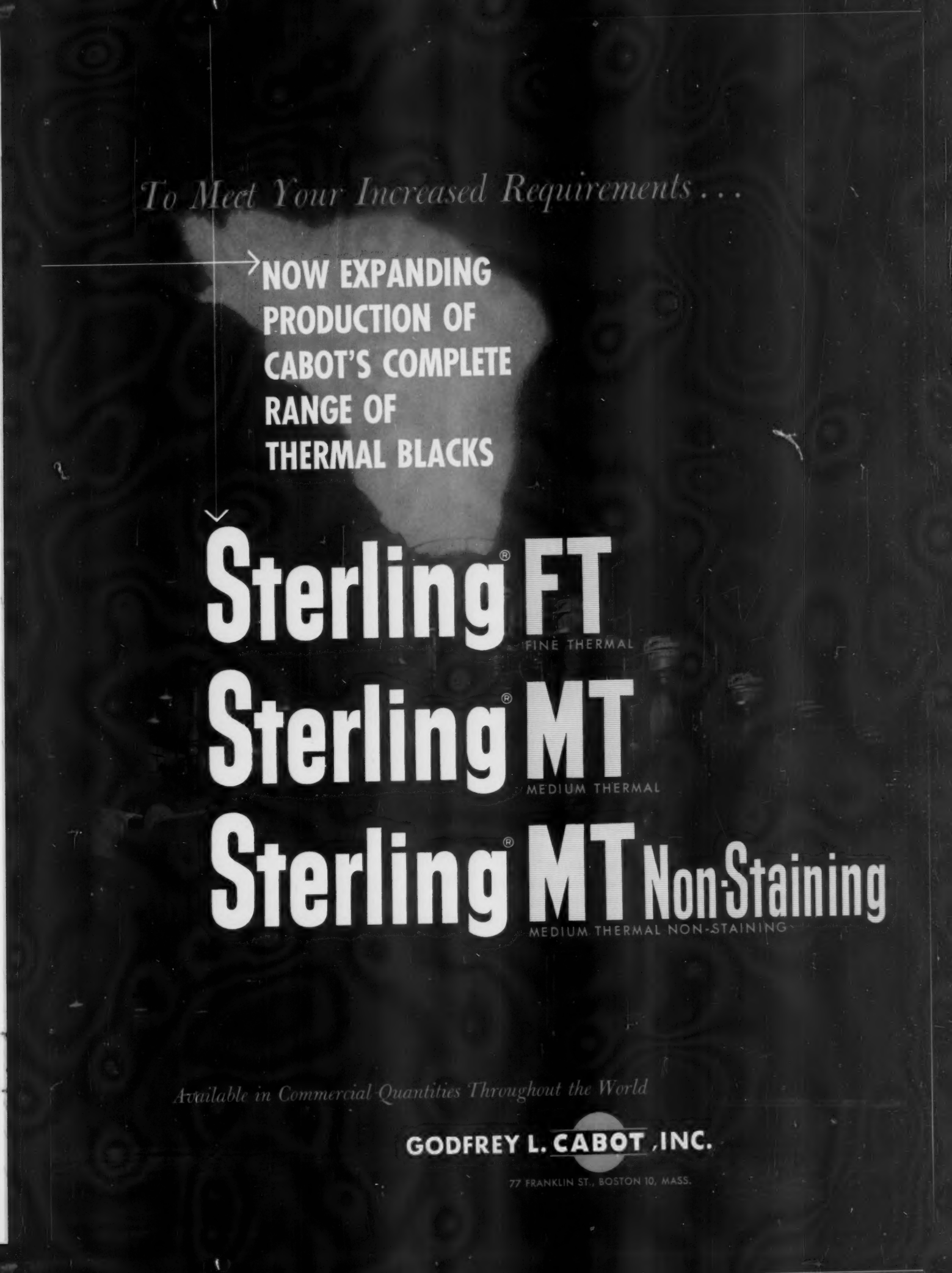
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AIRCRAFT HYDRAULIC HOSE | FIRE HOSE | V-BELT

Celanese*

Fortisan*-36 rayon finding many uses in Mechanical Rubber Goods Field...

FORTISAN-36, the new Celanese high tenacity, heavy duty saponified acetate rayon will be available for commercial use around October 1. Over the past two years extensive research and development by Celanese and a number of industrial firms using limited poundage have established it as a singularly useful industrial yarn.

FORTISAN-36 has very high tensile strength, resistance to stretch, and excellent dimensional stability. Some of its more obvious uses are:

IN V-BELTS: Used as a reinforcing member, FORTISAN-36's dimensional stability makes possible matching belts because it does not expand or contract with atmospheric changes as will belts made with most competitive fibers. V-belts made with FORTISAN-36 are now adapted for use as original equipment on such appliances as washing machines, sewing machines, air compressors, refrigerator condensers, air conditioners, garden tractors, lawn mowers, heating equipment, water pumps, and automotive uses.

IN FIRE HOSE: Its great strength permits a lighter weight hose with more flexibility. It is also a non melting fiber and the fact that it need not be heat stretched makes it an economical fiber for this application.

IN AIRCRAFT HYDRAULIC HOSE: FORTISAN-36's high strength means a considerable saving in weight as against other fibers which need extra bulk to compensate for lesser strength.

CONVEYOR BELTS, AUTO TRUCK TIRES, PLASTIC LAMINATES, FILTERS, PAPER REINFORCEMENT and many other applications give promise of improved performance when made with FORTISAN-36.

If you have a stake in any of these areas—or are concerned with any industrial application where high strength yarns are important—we'd like to work with you on the application of FORTISAN-36 to your products.

Our technical men have a wealth of data which may indicate some new approaches to your problems.

For further information, write Celanese Corporation of America, Industrial Sales Department, Textile Division, Charlotte, North Carolina.

*Reg. U. S. Pat. Off.

Celanese* Fibers for Industry

FORTISAN* RAYON • FORTISAN*-36 • ARNEL* TRIACETATE • ACETATE • VISCOSE-RAYON

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Chances are, you'll never order gold-plated pigment, but its use in the Glidden laboratory is important to you. Resinous replicas of test pigment particles are gold-plated to accent the high and low areas. When these replicas are micrographed through an electronic microscope, the 3-dimensional effect indicates the physical structure of the original particle. This electronic-micrograph is then compared with one of a standard particle to check uniformity.

Similar tests for impurities, color, hiding power and other properties are part of the Glidden quality control program which insures your satisfaction with Glidden ZOPAQUE Titanium Dioxides; CADMOLITH Reds and Yellows; SUNOLITH Lithopones. Write for detailed specifications.

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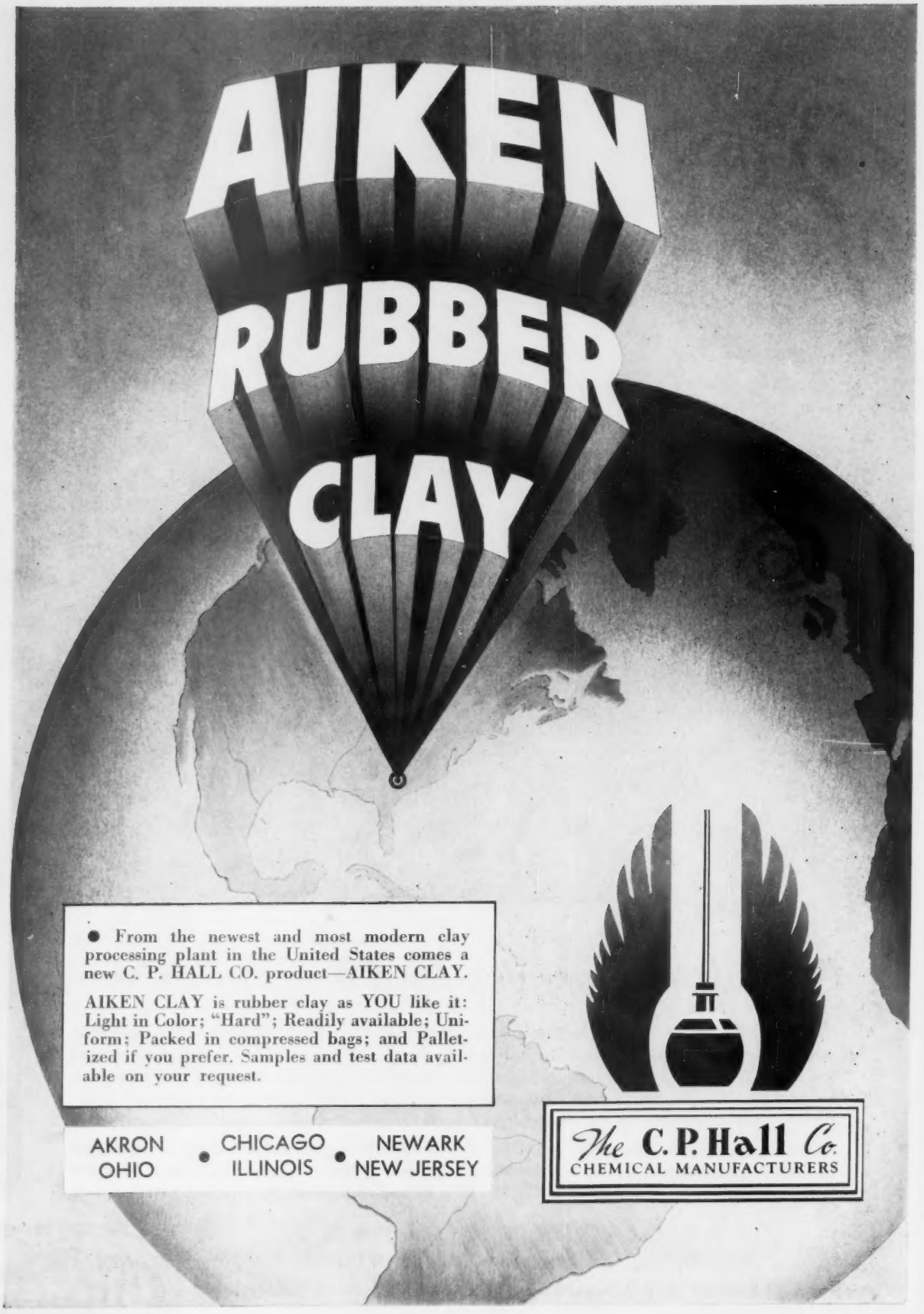
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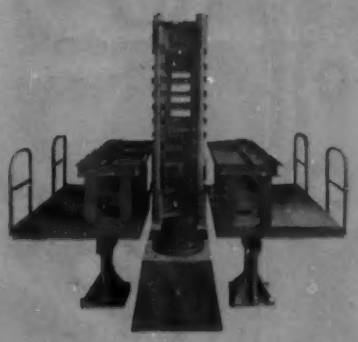

192-ton Multiple Opening Platen Press. Designed for molding rubber products. This press may be operated from an individual self-contained pumping unit or a central accumulator system. Two elevators operate with two presses working side by side. Write for catalog and engineering information on this and other R. D. Wood hydraulic presses for rubber, plastics, metalworking, and woodworking—without obligation.

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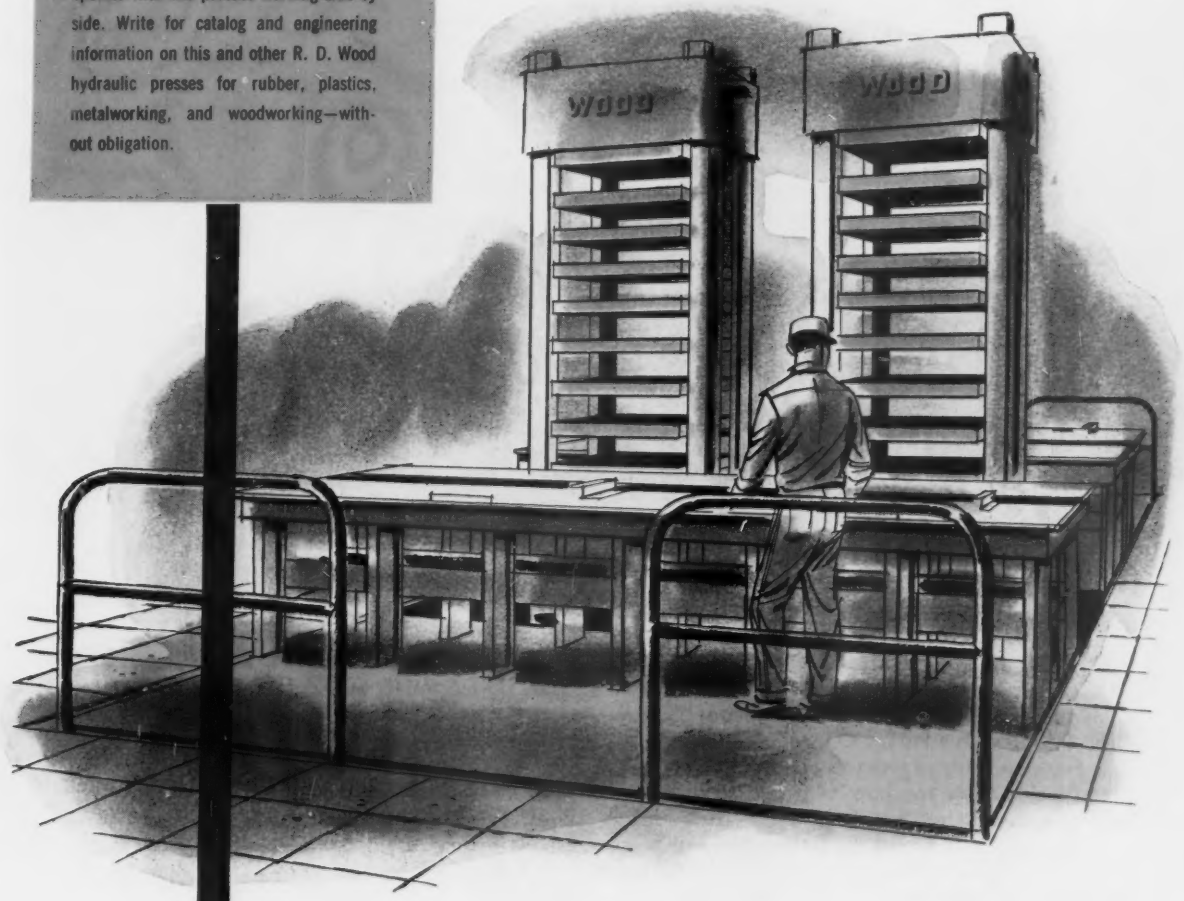
When you buy an R. D. Wood press, you can take *full value* for granted. In more than 150 years, the R. D. Wood nameplate has never appeared on a product of inferior quality. It is your guarantee of sound design, premium materials, superlative craftsmanship. It is your assurance also of smooth, trouble-free performance, high productivity, long life and production economies.



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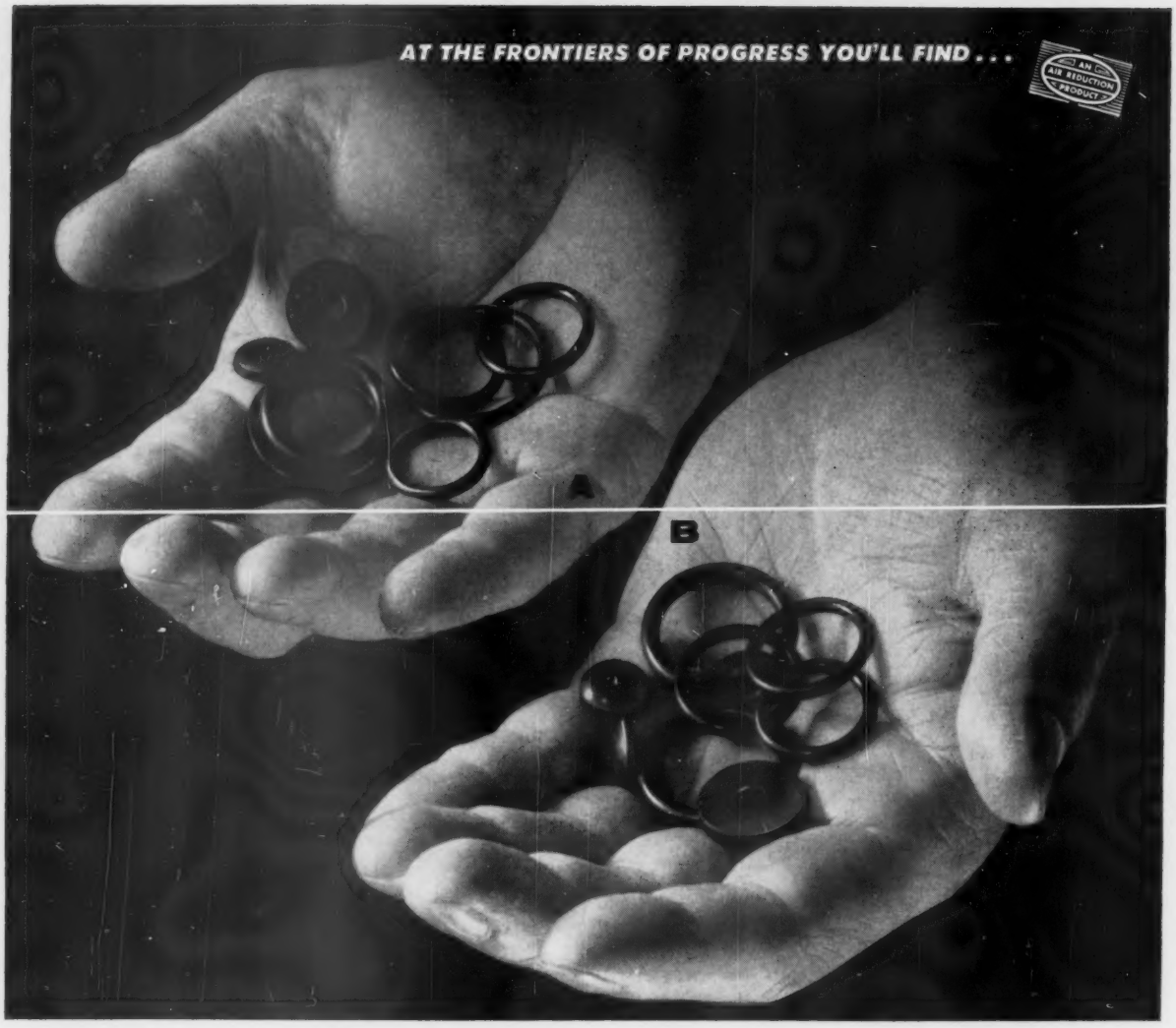

both samples trimmed by different methods . . . which one was finished 50 times faster?

It took 50 man hours to trim six thousand "Sample A" rubber fittings by hand. Yet it took one man only 1 hour to deflash the same number of "Sample B" fittings with a Pureco CO_2 rubber tumbler!

Pureco is ready to give you an on-the-spot demonstration to show you how a "frozen" rubber tumbling technique can knock deflashing costs cold.

A tumbler will be actually installed in your plant. Use it to tumble a variety of rubber fittings. See how you obtain better results, lower labor costs, fewer rejects and get gentler handling of delicate parts.

Or, if you prefer, ask your Pureco man to take a supply of "problem" parts to Pureco experts. Receive a confidential laboratory report on the tumbling method and the CO_2 form which will best serve you — CO_2 crushed "DRY-ICE" blocks, liquid CO_2 for better temperature control or CO_2 "snow" for tumbling close-tolerance precision parts.

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with Improved Mold Definition and Smoother Surface Finish plus

PRODUCTION ECONOMY

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RUBBER SUBSTITUTES can give you better results in processing with economy in production . . . There are many grades to serve in many different types of compounds of natural, reclaim and synthetic rubbers — and to provide varying properties. These vulcanized vegetable oils are non-thermoplastic, resilient solids which are readily dispersed in rubber compounds either by mill or Banbury. There are white grades for white or light colored products, brown grades for use in compounds where light color is not a requirement, and in modified brown grades containing plasticizers and fillers.

As Processing Aids

Rubber Substitutes aid processing by giving better mixing, extrusion and calendering, and good dimensional stability in soft stocks.

As Extenders

Rubber Substitutes help extend the higher cost oil-resistant synthetic rubbers and improve their rubber-like qualities.

As Softeners

Rubber Substitutes serve well as polymeric plasticizers and softeners.

For Improved Properties

Rubber Substitutes will improve oil, ozone and light resistance of many stocks, give better mold definition and provide smoother surface finish.

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Only the finest high-tensile steel wire such as that produced on special equipment at the Akron, Ohio, plant of Johnson Steel & Wire Company, can build tire beads that provide the strength needed for tubeless tires.

Layers of wire, insulated by synthetic compound to prevent friction, are encased in a "flipper." The flipper is built into the green carcass to become an integral part of the tire.

Steel

While driving your automobile down some peaceful country highway, have you ever struck a chuck-hole so hard you thought it might rip the tires off the wheels?

The fact is that few tires escape these occurrences at sometime or another while they are in service on your car.

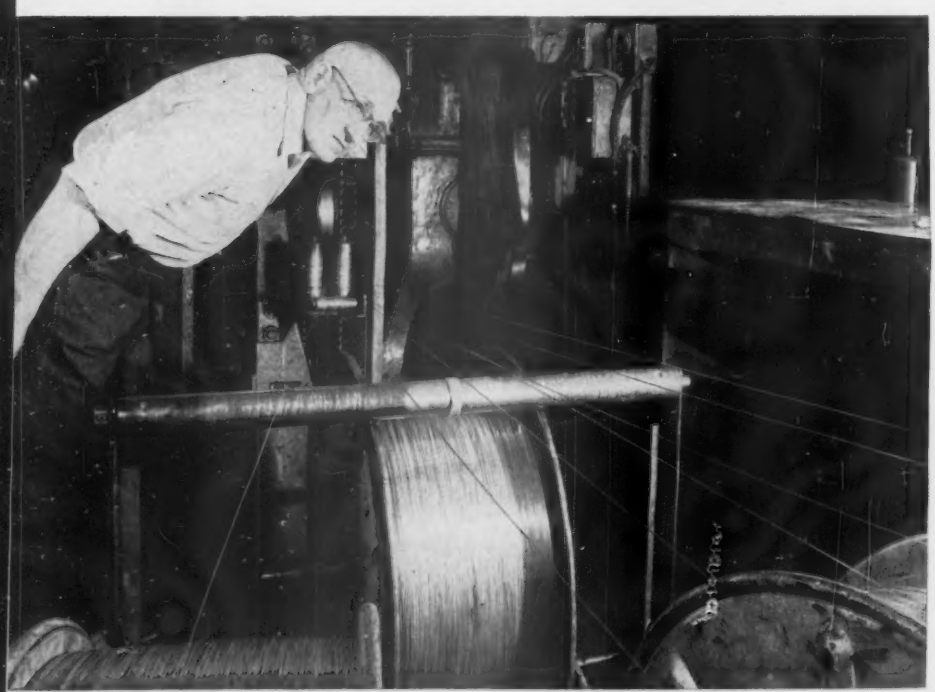
Truck tires, carrying heavier loads, take rougher punishment. The tires on earth-moving equipment stand up under it continually in normal day-to-day operations. So tires are built for rugged use, and then some.

Take the tire beads of steel wire that anchor the tire to the rim, for example. It is a special wire.

As produced by Johnson Steel and Wire Company for all the blue-chip tire manufacturers, it meets exacting requirements for high tensile strength, twisting strength, elongation, and has special surface finish that provides adhesion to synthetic rubber compound in the tire.

Without steel wire, the revolutionary new tubeless tire would be impossible. In the old-style tire with tube, the tube contains the air pressure in the tire. In the tubeless tire, the tire walls must be anchored to the rim of the wheel so tightly that the air pressure is sealed in without a tube. Even under tremendous impact the air-tight seal will not be broken.

Look at the way Johnson's tire bead



Smooth and straight, parallel tire bead wires uncoil into a bead building machine where they are encased in synthetic compound that adheres to the bright bronze-plated surfaces.

Revolutionary new tubeless tires are anchored to wheel rims by steel wires of tremendous strength. Tire beads such as those for The Goodyear Tire & Rubber Company's tubeless auto tire, for example, contain 32 individual wires providing a total bead strength of 4½ tons.

Death-defying stunt drivers batter tubeless tires mercilessly. Steel bead wires absorb the impact, hold the tires to the rim so tightly that sealed-in air pressure cannot leak even under the most rugged road shocks. Tests like these demonstrate dependability of tire bead wire.

Tendons For Tubeless Tires

wire is built into tubeless tires at The Goodyear Tire & Rubber Company, for instance. To begin with, the wire is about 1/32-of-an-inch in diameter, very accurately drawn to a tolerance of two thousandths of an inch—so small that a 750-pound reel of it contains 38 miles of wire.

Yet this wire has a breaking strength of 285 pounds. In the construction of a bead for the tubeless automobile tire, the bronze-plated wires from several reels feed parallel into a bead building machine. They are insulated with synthetic rubber compound that adheres to the surface finish and encases them, and emerge in the form of flat black tape.

The tapes containing several parallel wires are wound one on top of another and wrapped together in a "flipper" containing 16 wires. The flipper is then encased by the tire fabric, making it an integral part of the tire construction.

The conventional 6.70-15 tubeless tire for your automobile, then, contains a total of 32 wires in the beads on both sides of the tire. This gives you a total bead strength in each tire equal to four-and-one-half tons—more than twice the entire weight of your automobile.

The new tubeless truck tires making their debut offer truckers assurance of less road delay and less deadweight load.

The beads in a tubeless tire for a five-to-ten ton trailer truck, for example, contain a total of 196 wires in both sides of the tire. This gives each tire a total bead strength of 28 tons—more than equal to the entire weight of a heavily loaded truck.

Johnson's bead wire meets tire makers' requirements with consistent uniformity, and for a very good reason. Johnson has been one of the pioneers in developing tire bead wire and other specialty wires serving a variety of industries.

Today its modernized facilities are producing a range that includes:

Aircraft cord wire, armature binding wire, wire for brushes, metal stitching, hose reinforcement, stapling wire, bobby pin wire, rope wire, oil tempered and MB hard drawn spring wire, and music spring wire right down to sizes as fine as a human hair.

If you use specialty wires in the manufacture of your products, why not call our closest district office and explore the cost-saving advantages of Johnson quality today?

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Worcester, Massachusetts

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Have you seen the new monthly... LOCKWOOD-HEILMAN RUBBER REPORT ...?

For many years Warren S. Lockwood edited and distributed "Lockwood's Monthly Rubber Report," which was widely read in the United States and 20 countries overseas. For many years, also, Howard H. Heilman has been one of the country's leading authorities on butadiene and an internationally known consultant on synthetic rubber generally.

Last year Lockwood and Heilman combined their respective experiences to forecast the trends of natural and synthetic rubber production and pricing over the next 10 years. This report was purchased, among others, by more than half of the organizations which recently bid on the synthetic rubber facilities. A monthly follow-up to that report during the disposal period was purchased by many major firms in the rubber, oil and chemical industries, both in the United States and overseas.

Now the synthetic plants are in private hands and what takes place in the production, distribution and pricing of butadiene, styrene, GR-S and other synthetics affects the entire industry from the Indonesian smallholder to the largest consumer of rubber. Equally what happens in the production, distribution and pricing of natural rubber vitally affects the synthetic industry—from prospective Texas butadiene producers to developers of completely new synthetic polymers.

Lockwood and Heilman are in a unique position to comment usefully on this constantly changing picture. Lockwood reported on rubber from Singapore, Djakarta and London for the U. S. Government, served as Executive Vice-President of the Rubber Manufacturers' Association and for many years was president of the Natural Rubber Bureau. Heilman was in charge of butadiene production for the Office of Rubber Reserve and is recognized by both government and industry leaders as a top expert on synthetic rubber costing. For the past 10 years he has served firms in the chemical and petroleum field as a consultant on petro-chemicals and related products.

This new monthly report is now available to clients at $300.00 per annum.

Reports will be included from time to time from outstanding natural rubber authorities in London, Amsterdam, Paris, Singapore and Djakarta. Natural rubber market trends will be featured. Reports from correspondents on synthetic technical research developments will be featured periodically. Trends affecting synthetic pricing will be watched particularly.

Both Lockwood and Heilman will be available to clients to interpret by telephone current market developments without additional charge. Special additional research desired by clients would be performed for mutually agreed-in-advance charges.

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LOCKWOOD-HEILMAN RUBBER REPORT

for . . . ☐ 6 months ☐ 1 year and bill me

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	HOT	COLD	COLD OIL EXTENDED
	PHILPRENE 1000 PHILPRENE 1001 PHILPRENE 1006 PHILPRENE 1009 PHILPRENE 1010 PHILPRENE 1018 PHILPRENE 1019	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503 NOTE: PHILPRENE 1019 AND 1503 ARE ESPECIALLY DESIGNED FOR THE WIRE AND CABLE INDUSTRY	PHILPRENE 1703 PHILPRENE 1706 PHILPRENE 1708 PHILPRENE 1711 PHILPRENE 1712
	PHILPRENE 1100 PHILPRENE 1104	PHILPRENE 1600 PHILPRENE 1601 PHILPRENE 1602 PHILPRENE 1605* *Philblack A cold rubber masterbatch	PHILPRENE 1803 similar to GR-S 1801 but incorporating 25 parts Philrich 5

PHILPRENE POLYMERS and MASTERBATCHES

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We are straining every effort and every reactor to meet the overwhelming demand for Philprene polymers and masterbatches. If we have not yet been able to take care of your needs, we certainly hope to be able to do so at some time in the future.

As you may know, our Sales-Service Laboratory is devoted to finding the answers to questions involving rubber technology. We invite you to discuss your problems with our technical representative. There's no obligation. Call on us at any time.

Phillips 66

PHILLIPS CHEMICAL COMPANY

Rubber Chemicals Division
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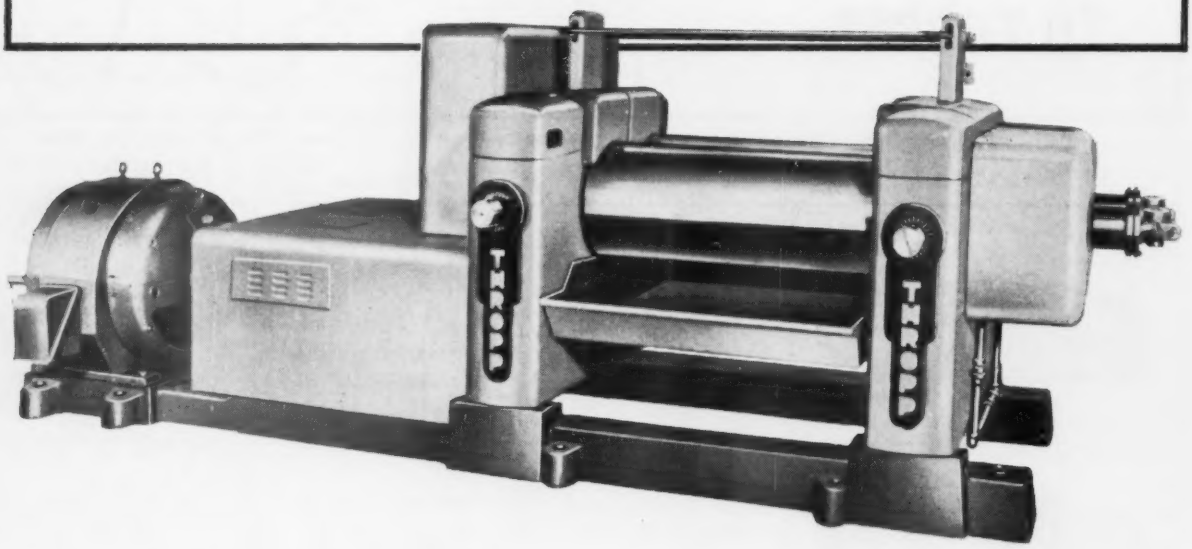
The THROPP 60″ MILL

bears down on production costs



This 60″ extra heavy duty streamlined mill is a hard worker for hard production schedules. Fully enclosed frames and guards keep cleaning and maintenance costs down. The mill has built-in herringbone gear speed reducers, mounted on anti-friction bearings. Other production mills are available in 42″, 50″, 72″ and 84″ sizes for the Rubber and Plastics Industries. Altogether, these mills represent a combination of good engineering and plain common sense.

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Memo

. . . to the Rubber Industry

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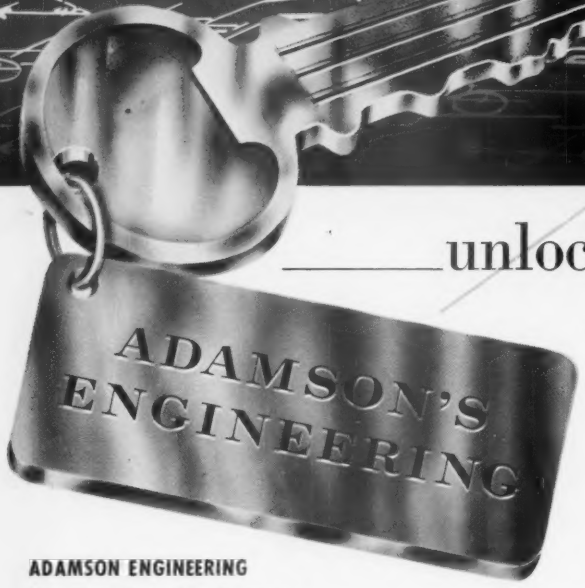
Calco®

AMERICAN Cyanamid COMPANY

INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT

BOUND BROOK, NEW JERSEY



_____unlocks the door to progress in many industries

Machine development, plant layout and industrial control is our business. By creating and perfecting unusual processes and special machinery for making entirely new products, or for processing new materials, Adamson Creative Engineering has enabled many industries to reduce expense and meet competition through the manufacture of better products at lower cost.

Our staff of experienced, highly trained engineers and designers, served by the entire resources of United Engineering and Foundry Company's Research, Development and Metallurgical Departments, is available and competent to find a solution to your processing problems. Their services are also available to assist you in the modernization of conventional or existing equipment.

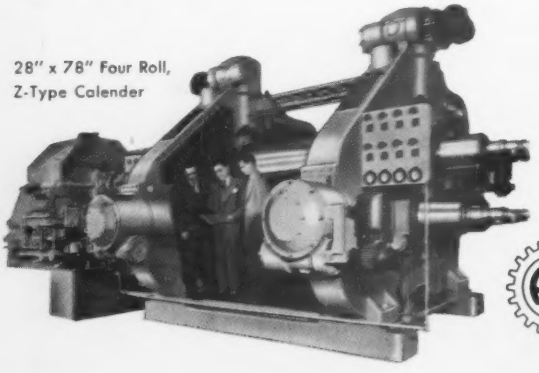
Adamson United's creative engineering assistance is as near as your telephone.

Why not call us today?

ADAMSON ENGINEERING

Has Contributed to Progress in the Following Fields

- Rubber
- Plastics
- Plywood
- Hardboard
- Concrete Block
- Chemicals
- Food Processing
- Pharmaceuticals
- Steel
- Automotive
- Aircraft



28" x 78" Four Roll, Z-Type Calender

Adamson United Company

AKRON 4, OHIO

SALES OFFICES IN PRINCIPAL CITIES

Subsidiary of United Engineering and Foundry Company

Plants at: PITTSBURGH • VANDERGRIFT • YOUNGSTOWN • CANTON • WILMINGTON (Lobdell United Division)

FOR THE BEST QUALITY/COST RATIO IN ALL TYPES OF VINYL COMPOUNDS

. . . add this **3** *plasticizer* **low volatility** *combination in proportions to meet individual quality/cost requirements*

Cabflex® DDP DI-DECYL PHTHALATE + **Cabflex® TCP** TRICRESYL PHOSPHATE + **Cabflex® DDA** DI-DECYL ADIPATE

Cabot makes the Cabflex plasticizers, Cabflex DDP, Cabflex TCP, and Cabflex DDA for use in vinyl plastics compounds, but does not manufacture the compound itself.

Cabflex DDP, BASE PLASTICIZER, gives low volatility, low water extraction, and good low temperature properties

Cabflex TCP, MODIFYING PLASTICIZER, improves processing, increases the compatibility range of plasticizer systems, stabilizes DDP against oxidation and flameproofs your compounds

Cabflex DDA, LOW TEMPERATURE PLASTICIZER, increases the flexibility range

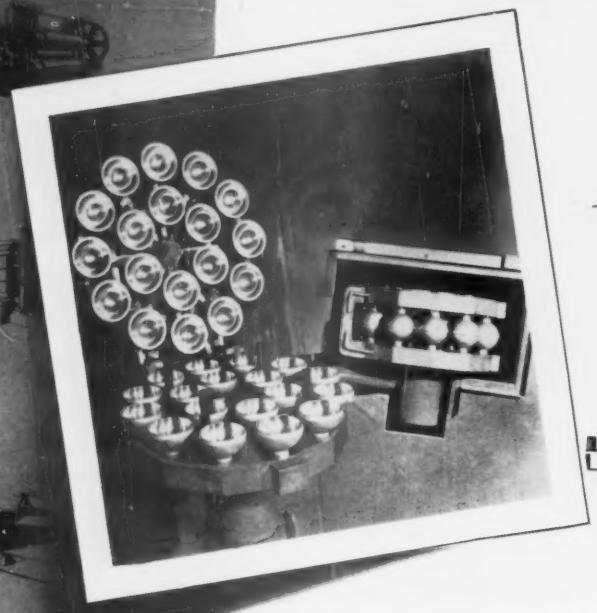
ORDER ALL THREE IN MIXED TANK CAR and TANK TRUCK QUANTITIES . . .

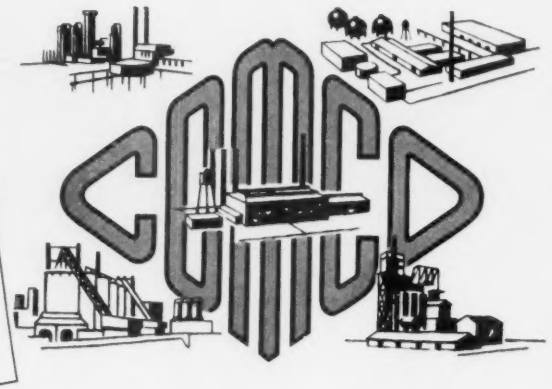
Now! . . . Shipments Immediately Available

CABOT PLASTICS CHEMICALS DIVISION

GODFREY L. CABOT, INC. 77 Franklin St., Boston 10, Mass.

CABFLEX®Di-OP (di-iso-octyl phthalate)
CABFLEX®DOP (di-2-ethylhexyl phthalate)
CABFLEX®ODP (iso-octyl decyl phthalate)
CABFLEX®DDP (di-decyl phthalate)
CABFLEX Di-OA® (di-iso-octyl adipate)
CABFLEX®DOA (di-2-ethylhexyl adipate)
CABFLEX®ODA (iso-octyl decyl adipate)
CABFLEX®DDA (di-decyl adipate)
CABFLEX®Di-OZ (di-iso-octyl azelate)
CABFLEX Di-BA® (di-iso-butyl adipate)
CABFLEX®TCP (tricresyl phosphate)
CABOL 100 (hydrocarbon oil plasticizer)





NEW PRODUCTS CREATE BUSINESS FOR RUBBER MANUFACTURERS

Opening up a new field in Plastisols, this high production rotational casting machine pictured above, is being enthusiastically received by progressive managements. It permits the molding of *any* hollow article.

Completely new hollow, molded playballs, drug sundries, toys and automotive parts made from Plastisols give better product appeal.

Whatever your product, our experience can help its development. Besides furnishing the machines, molds and the dispensing units, our facilities include product design and engineering.

If you are in need of a machine or an item of special equipment, if you intend expanding your facilities or plan entering new fields of manufacture, consult us first. We supply all machinery and equipment for every requirement of large and small factories.

Integrated Service provides complete design, layout and construction supervision for rubber, plastics and chemical plants, process engineering, technical service and raw material sources.

Continental Machinery Company, Inc.

AND

ASSOCIATED ENGINEERS AND ARCHITECTS

261 BROADWAY, NEW YORK 7, N. Y.

TELEPHONE: WORTH 2-1650 • CABLE: "CONTIMAC" NEW YORK

Rubber Production Flows Smoothly with...

GLYCERIZED LUBRICANT

(LIQUID CONCENTRATE)

THE ALL PURPOSE EXTERNAL LUBRICANT

NATURAL SYNTHETIC AND RECLAIM STOCKS

DOES NOT INTERFERE WITH TACK OR KNIT

Prevents adhesion of hot rubber slabs when piled . . . banishes dust nuisance by replacing soapstone or talc . . . prevents sticking during cure of extrusions and flat pan coiled tubing . . . excellent release agent for molds, mandrels, air bags, belt drums . . . equally satisfactory for washing and finishing inner tubes; imparts satiny finish . . . greatly aids in the processing of insulated wire and cable. The Production Departments and Laboratories of many rubber manufacturers, through years of using GLYCERIZED, give ample proof of its outstanding qualities as a lubricant for natural, synthetic and reclaimed stocks.

HERE'S WHY

Economical?

HIGHLY CONCENTRATED

1 drum makes up to 50 drums of working solution.

Also Mfgrs of

TWO OTHER FACTORY PROVED RUBBER PROCESSING AGENTS

RUBBEROL AND SYNTHOL

QUALITY SINCE 1884

GENSEKE BROTHERS

RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street — Chicago 32, U.S.A.

Fabric helps keep power under wraps ...underwater

Three different kinds of fabric tapes are used in this Okonite high voltage power cable.

"Packaging" power to do a job is a long-time specialty of the Okonite Company, Passaic, New Jersey. Their submarine electrical control and high voltage cables must not only deliver power, but also long lasting, reliable and efficient operation. Fabric is a partner in this job. Okonite uses Wellington Sears "Columbus" sheeting in a variety of forms for cable assembly. This sheeting fabric is outstanding for uniformity of quality, durability and mechanical strength. It is processed by Okonite into binder, curing and semi-conducting tapes for "wrapping-up" cable components—some more than 4 miles long. It is interesting to note that "Columbus" sheeting is used by industry not only for tapes, but for other coating and rubberizing applications, such as automobile and furniture upholstery, luggage and hospital sheeting. It is representative of the wide range of fabric constructions—cotton and synthetic—available to the rubber industry from Wellington Sears. If you think you can use our century of experience as "Headquarters For Industrial Fabrics," let's get together—or write us for illustrated booklet "Modern Textiles For Industry." Address Dept. 9G

Wellington Sears

A Subsidiary of West Point Manufacturing Company

FIRST In Fabrics For Industry

For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products

Wellington Sears Co., 65 Worth St., New York 13, N. Y. • Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis

Pyratex

a new cord treatment for new tire toughness!

Naugatuck – developer of the first natural latex for tire cord treatment, then the first reclaim dispersion, and later GR-S plus Resorcinal – now offers you a special vinyl pyridine latex that increases rubber-to-fabric adhesion up to 50%!

New Pyratex

- binds rayon to rubber with a grip almost as strong as the cord itself.
- retains its outstanding adhesion even under the severe heat and flexing of high-speed tire travel.

What's more, this superior solutioning agent...

- develops adhesion more rapidly with cure.
- greatly reduces "curing blows."
- is supplied at higher solids with resulting conveniences.

You'll find Pyratex will raise the performance of reinforced rubber in airplane, truck, bus, and automobile tires, in V-belts and conveyor belts—*wherever* fatigue resistance and ply separation pose problems.

New Pyratex is available for your own further compounding, or as a **Lotol, custom-compounded and ready to use—with good storage stability.** To find out more about how it can help your product—economically—write on your letterhead to the address below.

Naugatuck Chemical

Division of United States Rubber Company

Naugatuck, Connecticut

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • **IN CANADA:** Naugatuck Chemicals, Elmira, Ontario
Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N. Y.

At harvest time, when a half-hour's delay in the field can cost enough wheat to make 1,000 loaves of bread, uninterrupted combine operation is of urgent importance to the farmer.

Delays used to be caused by stretched or broken V-belts. B. F. Goodrich solved that problem—and won a new market—with a Grommet Belt made of rubber reinforced with strong, shockproof rayon cords.

B. F. Goodrich selected high-tenacity rayon for its resistance to shock and stretch, and for its unique flexibility. Now, one Grommet Belt with its rayon cords stands up better than a set of three ordinary belts.

Rayon is an established success in the tire field. And now Enka high-tenacity rayon is being used increasingly in V-Belts and conveyor belts...helping to do jobs better and at lower cost in factories and mines as well as on the farm. Write today and find out how Enka rayon technology can help you.

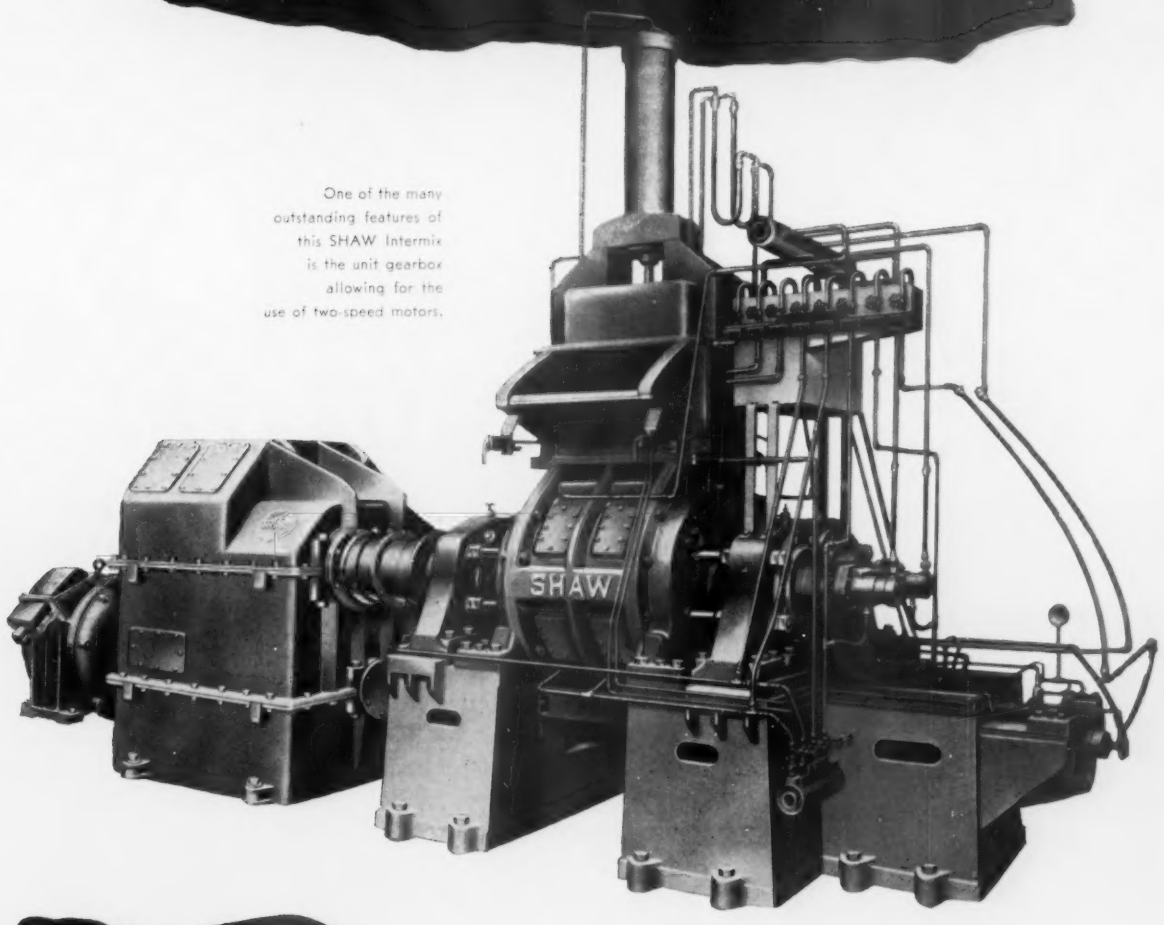
how rayon meets a farmer's problem

AMERICAN **enka** CORPORATION · *makers of rayon and nylon for textiles and industry*

206 Madison Avenue, New York 16, N. Y. MU 9-0510
428 Jefferson Standard Bldg., Greensboro, N. C.
2001 Industrial Bank Bldg., Providence, R. I.

the latest

SHAW INTERMIX



One of the many outstanding features of this SHAW Intermix is the unit gearbox allowing for the use of two-speed motors.

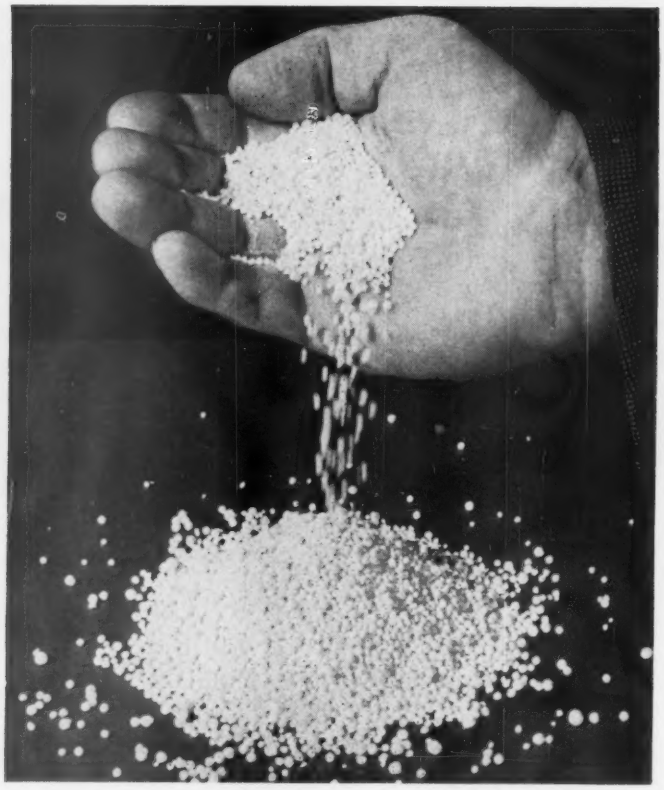
SHAW

SHAW'S add to their noted machinery for the Rubber and Plastics Industries with this new, highly efficient Heavy Duty Internal Mixer for breaking down and mixing natural and synthetic rubbers at lower temperatures than are usually associated with this activity. Yet it can be steam heated for mixing plastics and other materials.

FRANCIS SHAW & COMPANY LIMITED, MANCHESTER 11, ENGLAND Telex 66-357
LONDON OFFICE: 34, Victoria Street, London, S.W.1. Telephone Abbey 5077/8

Enquiries to:

FRANCIS SHAW (CANADA) LIMITED GRAHAM'S LANE BURLINGTON ONTARIO CANADA
TELEPHONE: NELSON 4-2250 TELEGRAMS: CALENDER BURLINGTON ONTARIO



PELLETED PROTOX-267
...Cuts Unloading Costs up to 33%

You can make substantial savings in handling Protox-267* zinc oxide as compared with conventional oxides, whether you use manual or mechanical methods.

1. MANUAL UNLOADING

You can load on each handtruck or pallet up to 3 times as much Protox-267 because its bags are more compact. That means fewer trips from car to storage—thus faster, lower-cost unloading.

2. FORK-TRUCK UNLOADING

You can save up to $30 on unloading each 36-ton car of Protox-267 when you handle its convenient unit loads mechanically rather than by hand.

You will find Protox-267 also cuts your storage costs and processing costs.

Protox-267 bags weigh the conventional 50 pounds, but are smaller and more convenient to handle due to low dry bulking of the oxide.

*U. S. Patents 2,303,329 and 2,303,330

THE NEW JERSEY ZINC COMPANY

Producers of Horse Head Zinc Pigments

... most used by rubber manufacturers since 1852

160 Front Street, New York 38, N. Y.

HORSE HEAD PRODUCTS

to help you select

SHELL DUTREX

PLASTICIZERS and EXTENDERS

For GR-S and Natural Rubber

General purpose applications

Dutrex 6
Dutrex 7
Dutrex 6H (SPX-97)
Dutrex 20
Dutrex 15E
Dutrex 15W

Non-staining or light colored stocks

Dutrex 39
Dutrex 32

For Butyl Rubber

Dutrex 31
Dutrex 32

For Nitrile Rubber

Dutrex 21
Dutrex 25

For Neoprene W types

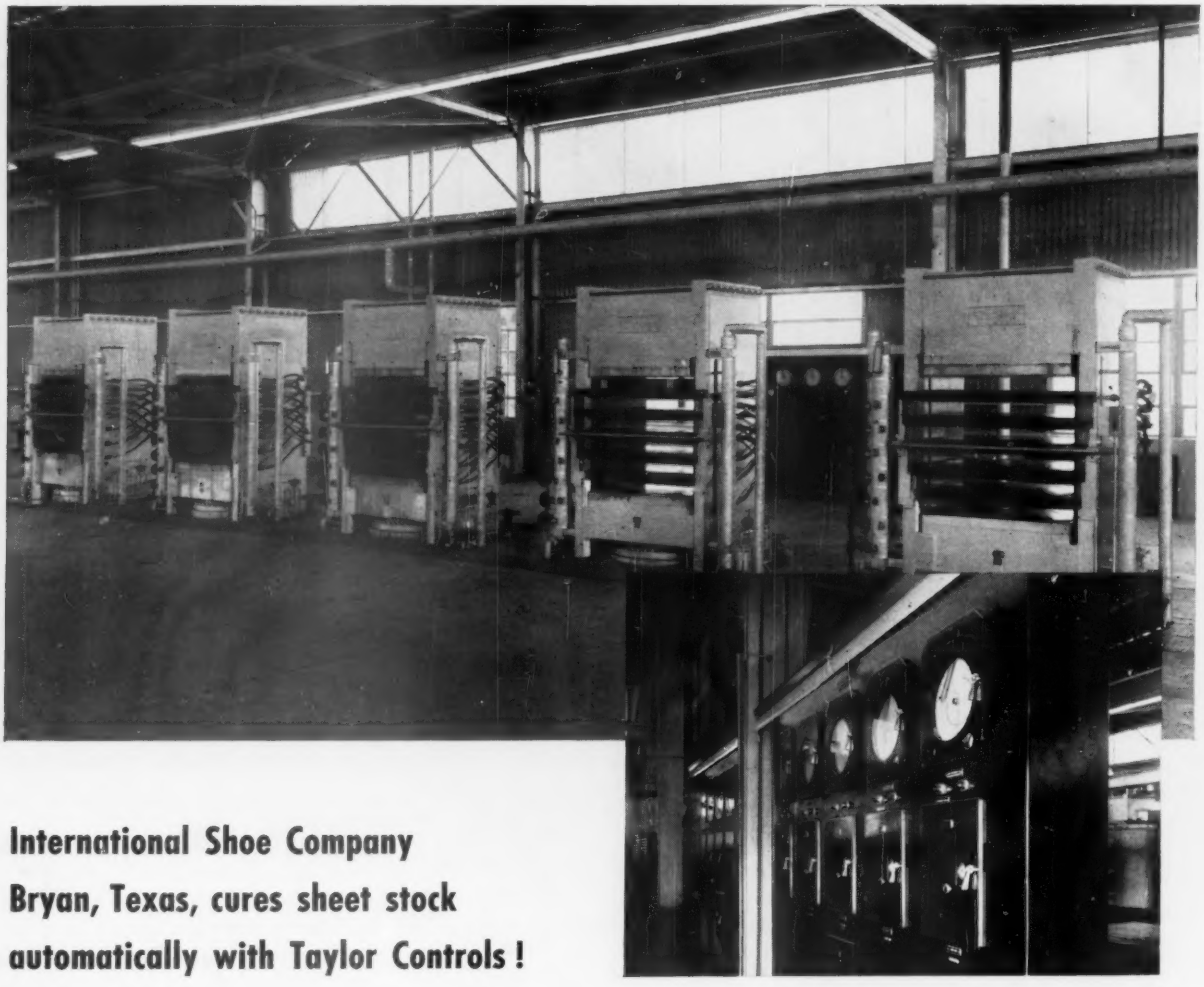
Dutrex 6
Dutrex 20

SHELL OIL COMPANY

50 West 50th Street, New York 20, New York
100 Bush Street, San Francisco 6, California

SHELL

SOLE CONTROL



International Shoe Company Bryan, Texas, cures sheet stock automatically with Taylor Controls!

TAYLOR controls on their platen presses provide many benefits for the International Shoe Company.

1. **They protect International's fine name by insuring a uniformly high quality in their sheet stock.**
2. **Press performance is 100% predictable.**
3. **Since the entire sequence and duration of the cure is automatically controlled, production schedules can be set up so that the minimum number of operators can be used for the maximum number of presses. Skilled operators are thus released for other duties.**

The larger photograph above illustrates the battery of French Oil Mill Machinery Co. 42″ x 42″ platen presses, with one of the Taylor instrument panels in the background. Inset picture gives a close-up view of the control panel for ten 30″ x 30″ presses. The FULSCOPE* Controllers at top regulate platen temperature, while the FLEX-O-TIMER* Time Cycle Controllers automatically operate the presses, from closing them through bumping, timing the cure, operating the valves in proper sequence and opening of the presses.

*Reg. U.S. Pat. Off.

Note the "off-the-press" location of all instruments on central panels. This gives more convenient access to working areas and enables operators to check performance at a central point. Better "housekeeping" and care of equipment also results.

To find out how you can profitably put Taylor to work in your plant, call your Taylor Field Engineer, or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

Indonex plasticizers

in
GR-S Extruded Bumper Compounds *

Impart good processing and extrusion characteristics—minimize temperature build-up and deterioration under repeated impact.

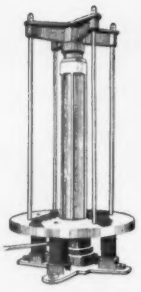
Send for INDONEX Plasticizers Circulars 13-51. *

*Circular 13-52 covers
Molded Bumper Compounds

INDOIL®
CHEMICAL PRODUCTS

INDOIL CHEMICAL COMPANY 910 South Michigan Avenue, Chicago 80, Illinois

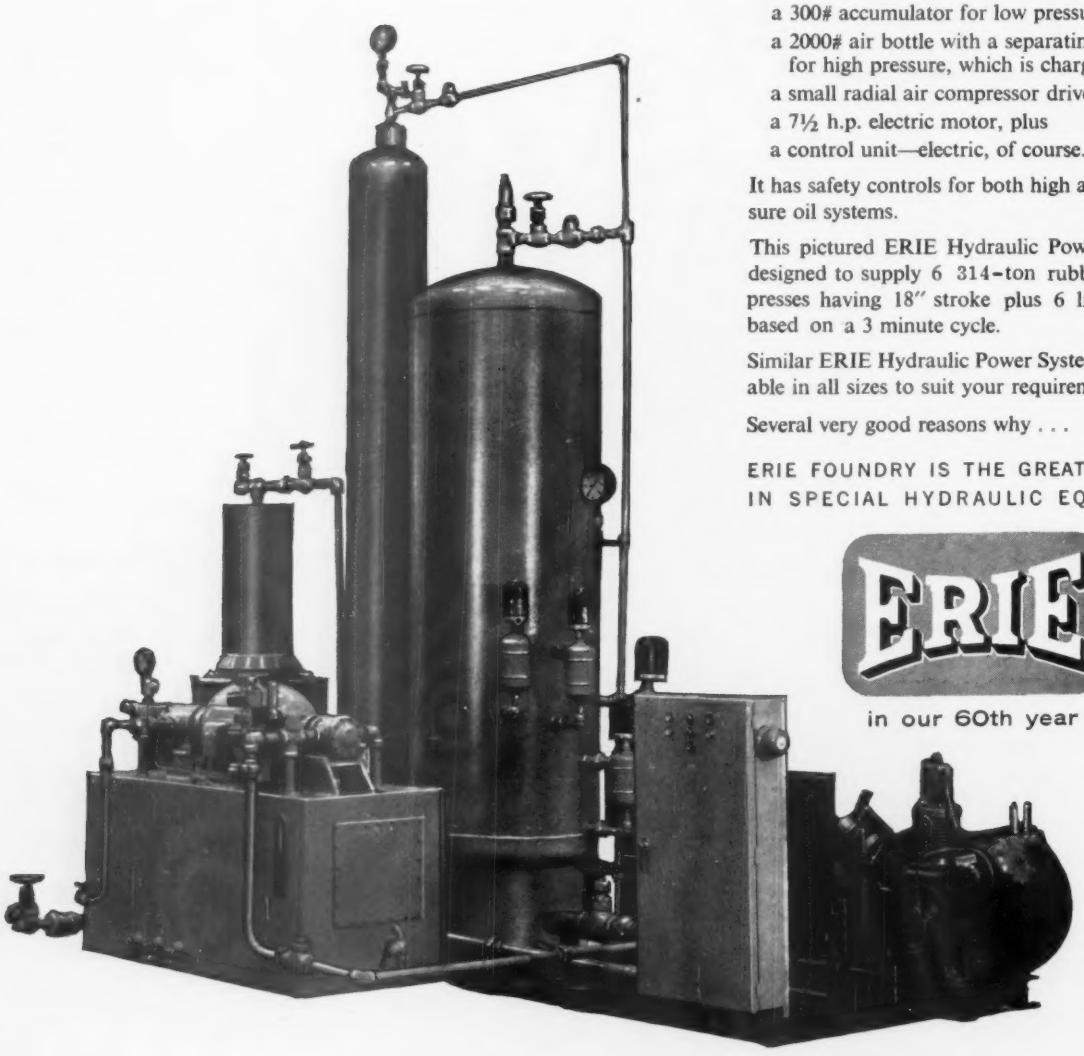
in the good old days



When it was necessary to reinforce the floor under the weight-type accumulator installation . . . when the maintenance gang held its breath to see if the old accumulator would rise far enough to keep pressure in the lines . . . when it was possible to keep packing on the accumulator ram only for a week or so

ERIE FOUNDRY WAS A GREAT NAME IN SPECIAL HYDRAULIC EQUIPMENT

today . . . we're still pioneering . . .



Erie Foundry offers this compact, lightweight, minimum maintenance hydraulic power system with many worthwhile advantages:

- a 10 h.p. electric motor which drives
- a 300# accumulator for low pressures, and
- a 2000# air bottle with a separating cylinder for high pressure, which is charged by
- a small radial air compressor driven by
- a 7½ h.p. electric motor, plus
- a control unit—electric, of course.

It has safety controls for both high and low pressure oil systems.

This pictured ERIE Hydraulic Power System is designed to supply 6 314-ton rubber-molding presses having 18″ stroke plus 6 lift tables all based on a 3 minute cycle.

Similar ERIE Hydraulic Power Systems are available in all sizes to suit your requirements.

Several very good reasons why . . .

ERIE FOUNDRY IS THE GREATEST NAME IN SPECIAL HYDRAULIC EQUIPMENT

ERIE

in our 60th year

for more information call or write

HYDRAULIC PRESS DIVISION

ERIE FOUNDRY CO. ERIE, PA.

HEAT V LIGHT

HARSHAW VINYL STABILIZERS

for the vinyl plastic and coating industries

Important additives for processing and stabilizing clear and opaque vinyls—

CALENDERED FILMS AND SHEETS • EXTRUSIONS
RIGIDS AND FLEXIBLE
PLASTISOLS • ORGANOSOLS • COATINGS

CADMIUM 2-V-4

Leading heat and light stabilizer for clear or opaque stock, an organic liquid complex containing no disadvantageous soapy component. Unequalled for stabilizing against effects of sunlight or outdoor aging.

BARIUM-CADMIUM 128-V-5

Leading combination of coprecipitated laurates for outstanding performance, where lubricating advantages are required. Generally 30% more effective than common barium-cadmium laurates.

Best effects are attained for particular requirements by combining 2-V-4 or 128-V-5 in a stabilizing system with one or more of the following three stabilizers.

BARIUM 1-V-4

Compatible barium compound, minimum effect on viscosity. Permits processing at higher temperatures.

ORGANIC 8-V-1

Chelating agent, more than two times as effective as common organic phosphites. Inactivates harmful by-products to boost stability. Contributes to top clarity

ORGANIC 7-V-2

Epoxy assistant, highly effective HCl scrubbing agent, undiluted. Will extend stability for longer processing periods.

CADMIUM 28-V-2

For rigids, opaque to translucent. Stabilizes unplasticized resin efficiently and economically, with minimum effect on physical properties of product.

Write for a Vinyl Stabilizer Check List that you may use to detail as much as possible your particular requirements.

A practical stabilizing system will be suggested promptly, based on our experience with the various Vinyl Polymers and Copolymers and with the different Plasticizers, for your processing and product end-use requirements.

Stabilizing Systems developed for Harshaw Customers, for special processing and finished product properties, may contain one of the following stabilizers.

ZINC 9-V-1; Organic liquid complex containing no disadvantageous soapy component used in selected formulations.
CADMIUM 2-V-7: For modified solutions and organosols.
CADMIUM 24-V-1: Organic liquid complex for highest attainable clarity, used principally with dispersion resins.
CADMIUM 2-V-400: Modified 2-V-4.
CADMIUM 2-V-8: Selected laurate, used principally with low fusing resins.
BA-CD 12-V-5: Coprecipitated laurate.
CADMIUM 22-V-1: For rigid, clear and opaque stocks.
ORGANIC 7-V-1: Epoxy assistant.
ORGANIC 7-V-4: Epoxy assistant, for rigids.
BARIUM 1-V-3: Dispersible stearate, to contribute lubricity with barium effects.
BARIUM 1-V-6: For asbestos filled tile.
BARIUM 1-V-7: Liquid, for modified plastisols and organosols.
CALCIUM 5-V-1: Dispersible stearate, to contribute with calcium effects.
CALCIUM 5-V-22: Dispersible, low melting stearate to reduce internal friction.
ORGANIC 8-V-100: Modified 8-V-1.

THE HARSHAW CHEMICAL CO.
CLEVELAND 6, OHIO

GOODRICH-GULF CHEMICALS, INC.

a new name in the industry... opening a new era of private enterprise

YOU don't see it in the picture, but a significant change has taken place at this rubber plant in Port Neches, Texas.

In 1943 the plant began producing man-made rubber for the government, and in the years following made an important contribution to our national industrial strength.

Today, the Port Neches plant continues in full production under private ownership and operation. Its services are being expanded to meet the needs of rubber users throughout industry.

The trade-mark above and the trade-name below identify an already-established product, and assure you of complete reliability of product and service.

GOODRICH-GULF CHEMICALS, INC.
4317 CHESTER AVE., CLEVELAND 3, OHIO

A FAMOUS NAME...
AN ESTABLISHED PRODUCT

Ameripol Rubber

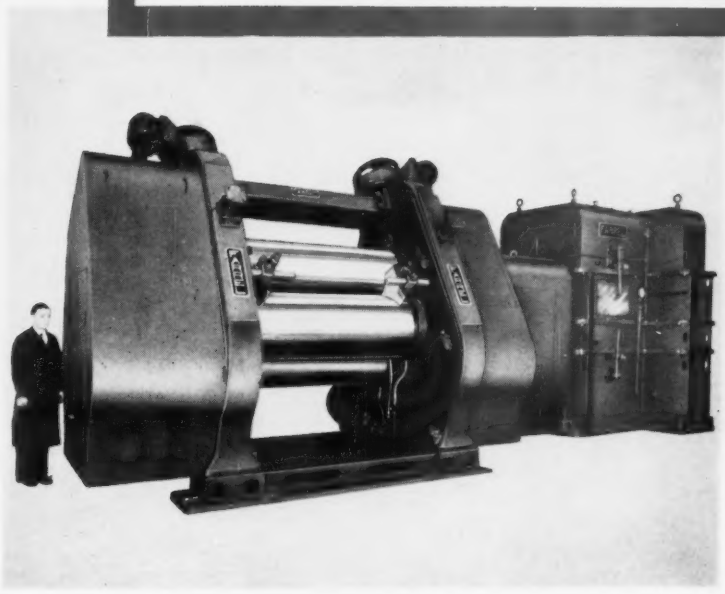
Reg. U.S. Pat. Off.

COLD NON-OIL POLYMERS
COLD OIL MASTERBATCH POLYMERS
HOT NON-OIL POLYMERS

FOUR-ROLL "Z" CALENDER

A leading rubber company, in describing its new Farrel-Birmingham "Z" calender train for double-coating tire fabric, says that it "insures unmatched uniformity of quality". Ideal for high-speed production of film, sheet and coated fabrics, as well.

How to get maximum accuracy in calendering



THREE-ROLL TRI-ANGULAR CALENDER—The machine of the future for any type of production requiring high accuracy for two calendering passes. Right-angle arrangement of rolls provides closer control of gauge and easier feeding conditions.

Recent and outstanding engineering contributions to the efficient conversion of raw material to finished product, are the Farrel-Birmingham four-roll "Z" calender and three-roll "Tri-angular" calender pictured here. These machines have established standards of calendering accuracy never before considered possible.

Among the refinements which contribute to this accuracy are motorized crossed-axes devices for fine adjustment of roll crown, and hydraulic pullbacks which hold the rolls in positive operating position.

When you bring your calendering problems to Farrel-Birmingham, you benefit from the experience and facilities that have gone into the development of machines like these. In fact, there's an excellent chance that the basic design for the "specialized" machine you require has already been worked out by Farrel-Birmingham engineers—and proved on the job.

Before you decide on a calender come to "calender headquarters". In the meantime, send for more information on the revolutionary "Z" and "Tri-angular" calenders.

F-B PRODUCTION UNITS

Banbury Mixers • Plasticators • Pelletizers • Extruders • Calenders • Mixing, Grinding, Warming and Sheeting Mills • Refiners • Crackers • Washers • Hose Machines • Bale Cutters • Hydraulic Presses and Other Equipment for Processing Rubber & Plastic Materials.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Pittsburgh, Chicago, Fayetteville (N.C.), Los Angeles, Houston

Farrel-Birmingham®

FB-1019

A NEW Weather-Ometer®

. . . for Weather Testing of Plastic and Rubber Products

MODEL DMC

Greater accuracy and reproducability achieved with new modulated temperature control.

Accuracy in test results is greatly increased in the new DMC Weather-Ometer by a positive control of specimen temperatures.

A constant volume of air at a controlled temperature in the heavily insulated cabinet, maintains uniform predetermined specimen temperatures regardless of variations in room conditions.

Automatic control of humidities up to dew point is available as optional equipment.

All automatic controls including complete voltage controls are located on the front panel of the Weather-Ometer directly above the door of the test chamber.

Both horizontal and vertical testing is available. Shallow containers are used for semi-liquid materials and vertical panels for solid materials.

Source of radiation is two Atlas enclosed violet carbon arcs.

Complete technical information on the DMC model and other Weather-Ometers is contained in the new Weather-Ometer catalog. A copy will be mailed on request.

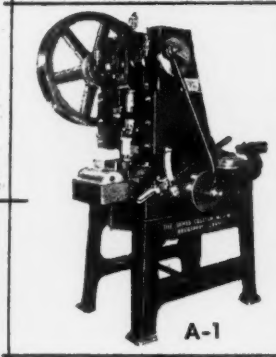
ATLAS ELECTRIC DEVICES CO.

4114 N. Ravenswood Ave., Chicago 13, Illinois

Manufacturers of accelerated testing equipment for over a quarter of a century.

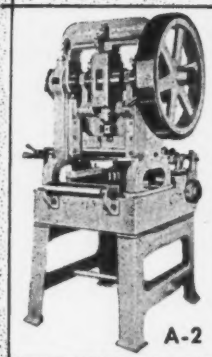
COULTER

THE KEY TO HIGHER QUALITY CUTTINGS



MODEL A-1

Cutting Heels at high speed production or short runs.



MODEL A-2

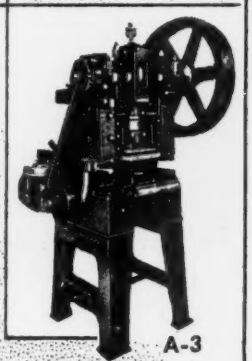
Cutting Multiple Heels, Half and Full Soles with stock grain.

MODEL A-2s

(Not illustrated)
Cutting across grain of stock.

MODEL A-3

Cutting Multiple Heels and Taps with or across stock grain.



Since 1896

coulter production machines

HAVE MEANT MORE IN HIGHER QUALITY CUTTINGS . . . MORE IN GREATER PRODUCTION.

the James COULTER *Machine Co.*

BRIDGEPORT, CONN.

BRIDGEPORT · CONNECTICUT

Here's **ONE** way to make **CARBON BLACK**

. . . a coin in the flame of a match — and you're making carbon black. But not with the controlled properties that make the big difference in your rubber compounds — particle size, conductivity, abrasion resistance, etc.

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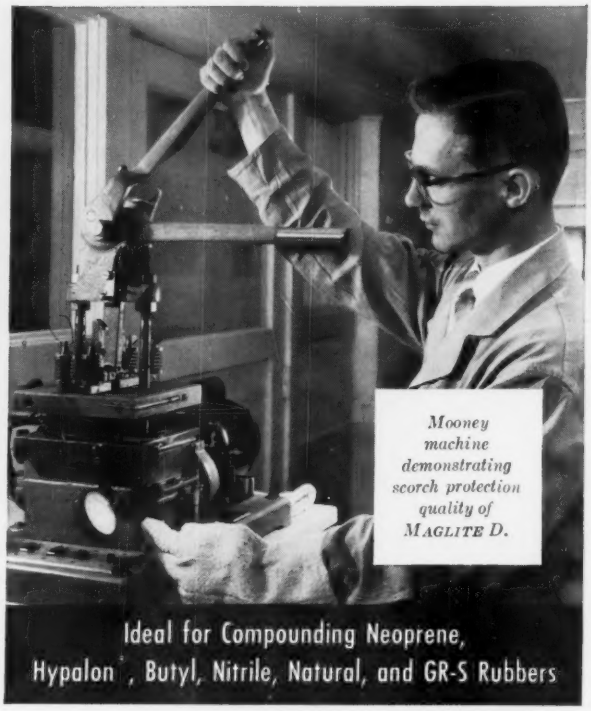
Mooney machine demonstrating scorch protection quality of MAGLITE D.
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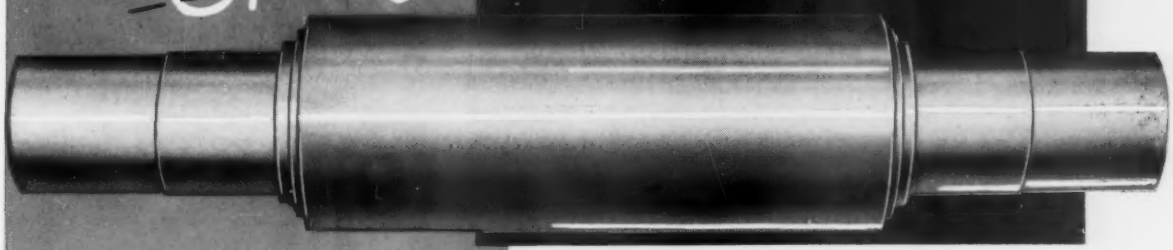

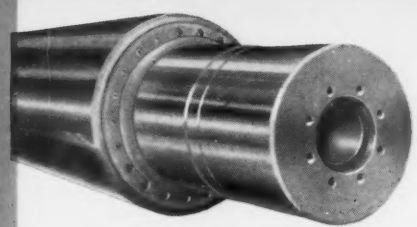

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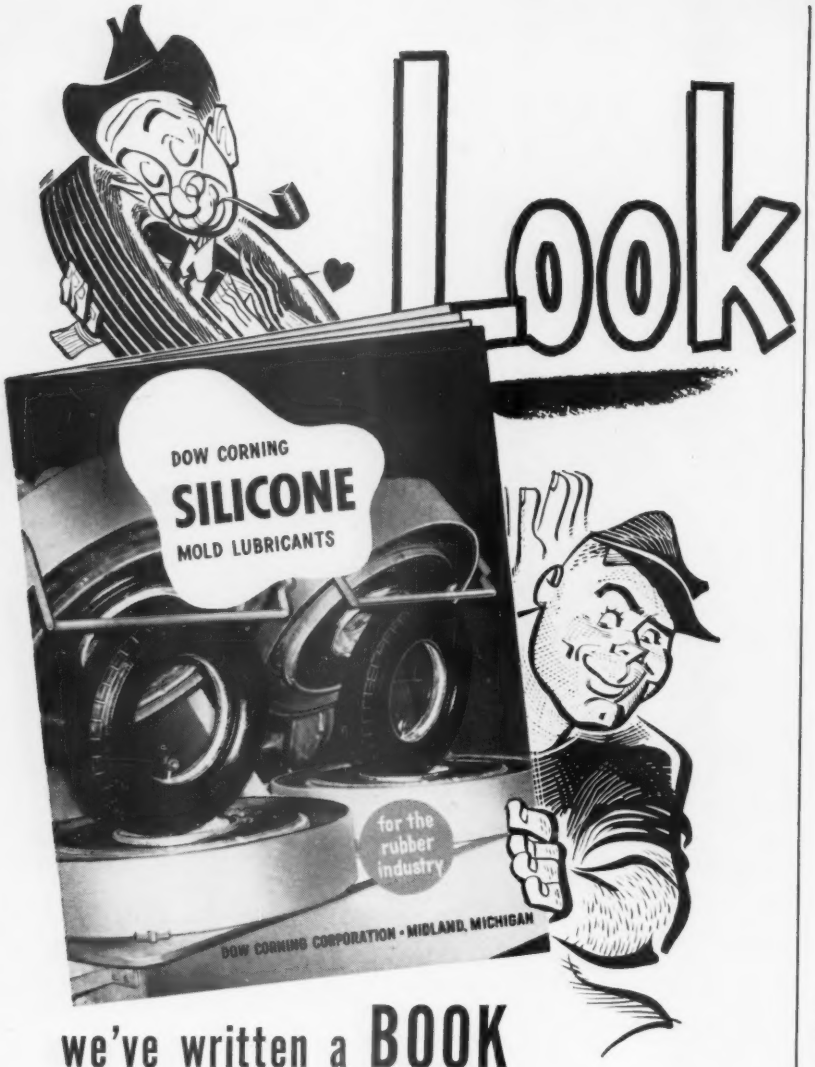

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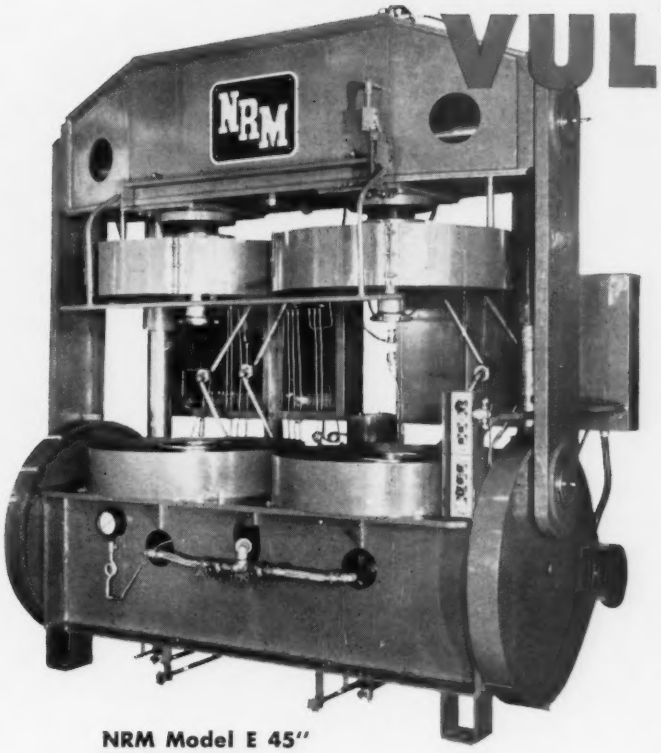

NRM Model E 45" Packless Autoform VULCANIZER

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"Today's tire manufacturers are using bonding agents* that literally *weld* the cords to the rubber"

says C. H. Peterson, President
U. S. Rubber Reclaiming Co., Inc., N. Y.

Mr. Peterson standing in front of the massive reclaiming equipment at the U. S. Rubber Reclaiming Co., Inc., plant in Cheektowaga, New York. At the left is a bale of reclaimed tire fabric, and at the right a pallet load of reclaimed rubber.

"THIS positive bonding has caused us one headache after another," adds Mr. Peterson. "The *better* the bond between the rubber and the tire fabric, the *tougher* our job becomes."

U.S. Rubber Reclaiming Co., Inc., has been forced to redesign its separation system time and again to cope with the constantly improved tires. Better grinding equipment has had to be developed to tear the stubborn fabric from the rubber. The power of the grinders, which was originally 150 h.p., has been increased steadily until it is now up to 450 h.p.

Although a "headache" to the U.S. Rubber Reclaiming Co., Inc., the toughness of today's tires is a definite advantage to the motorist.

* A good deal of the credit for permanent rubber-fiber bonds in tires can be claimed by Koppers Resorcinol. Resins made from resorcinol form an excellent bond—one that will take repeated pounding and wear, will withstand prolonged flexure under grueling service conditions without separating. Because of their superb adhesive properties, resins made from Koppers Resorcinol have also found wide application in the manufacture of industrial belting, hose, and many other heavy-duty rubber products where a powerful, lasting bond is needed between reinforcing fibers and synthetic or natural rubber.

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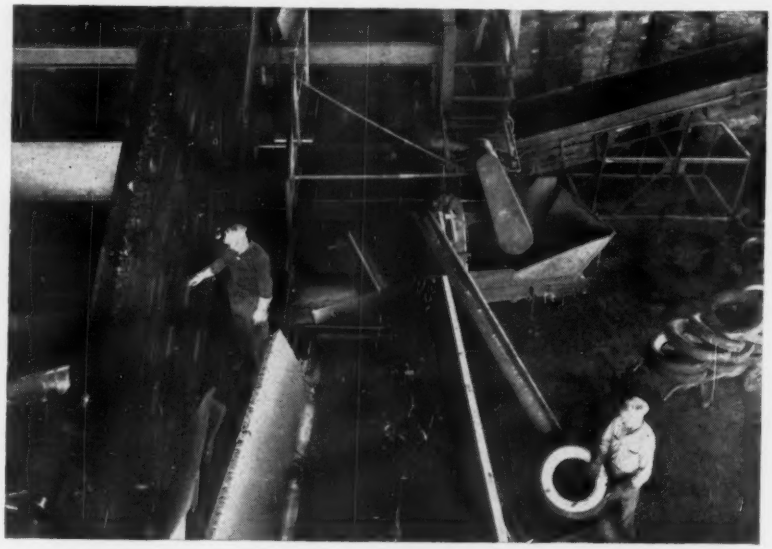

The rolling mill, commonly known as the "cracker." These powerful rolls actually tear the tires to pieces.

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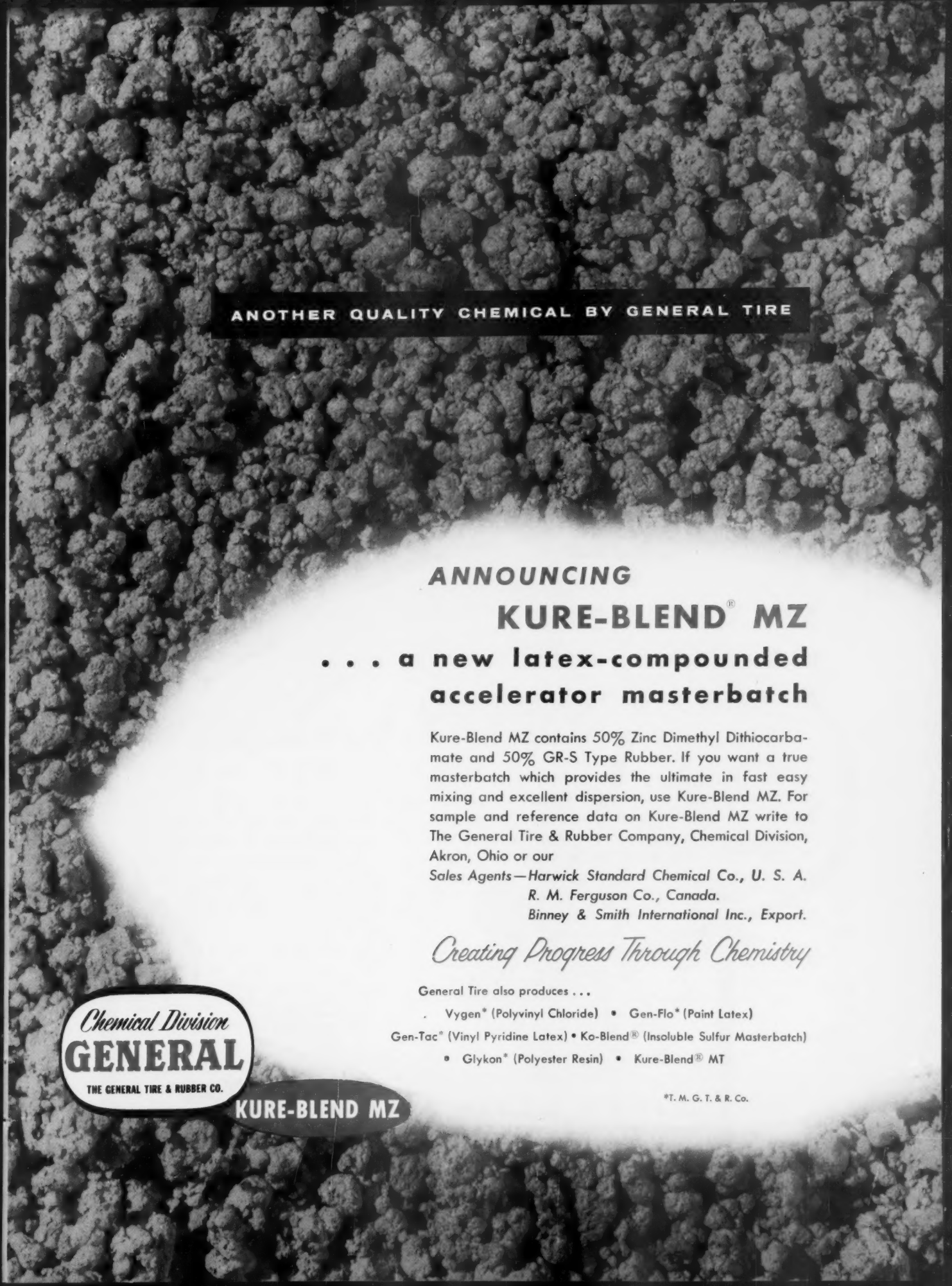
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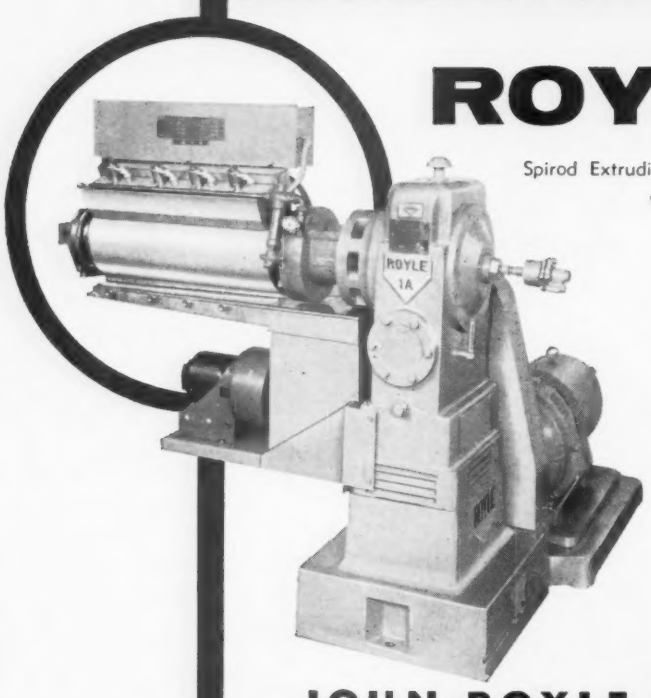

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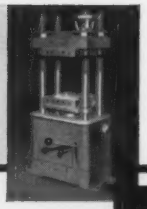

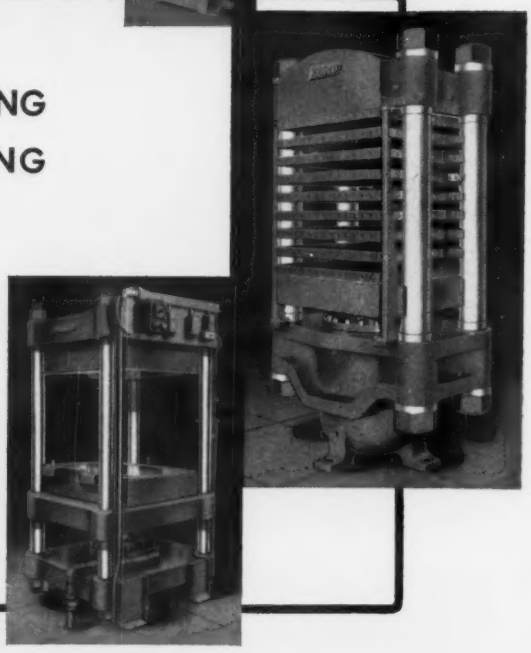

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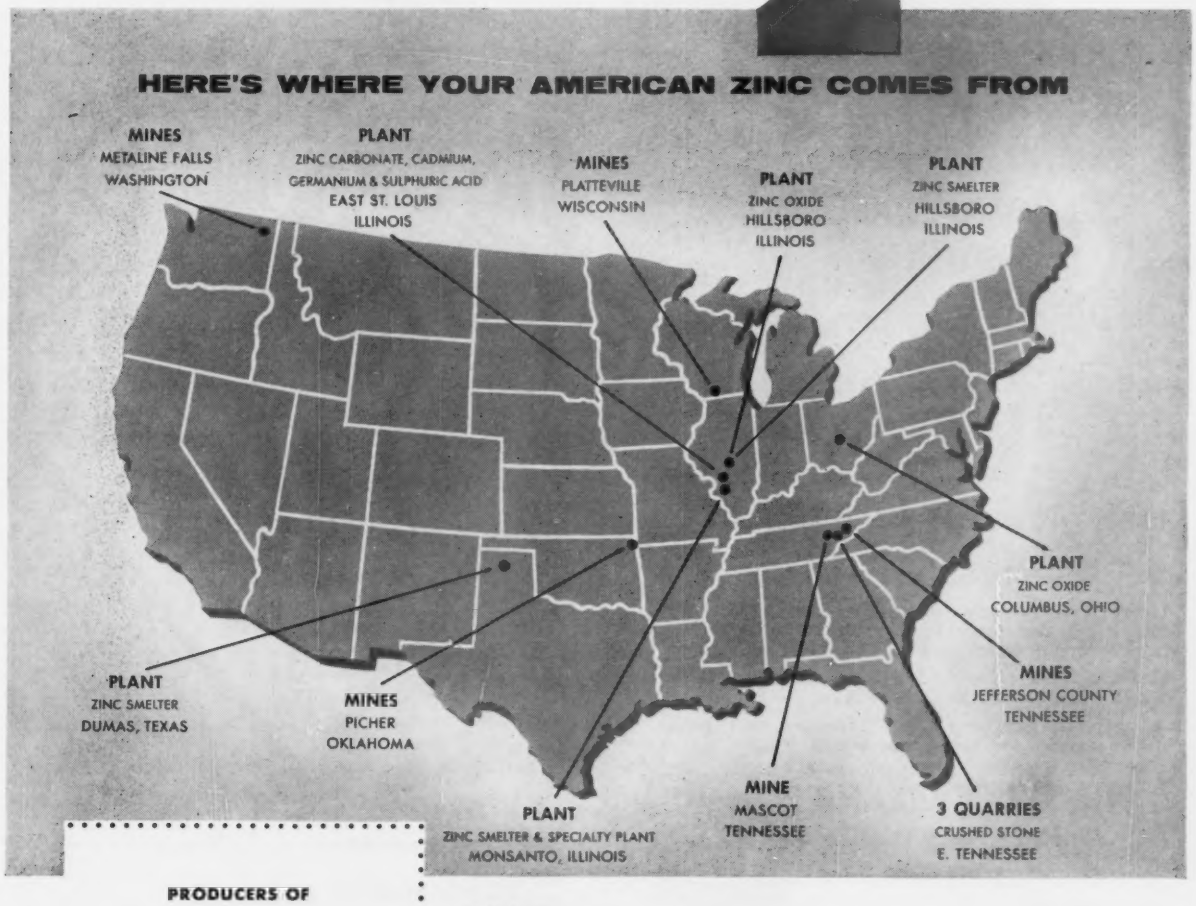

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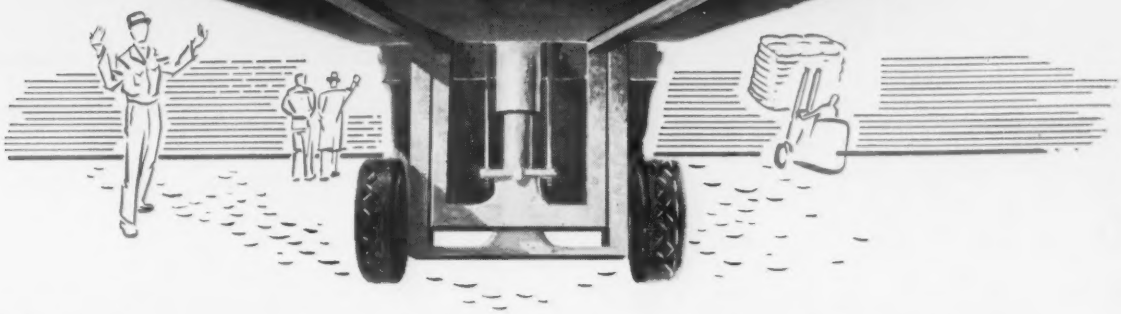

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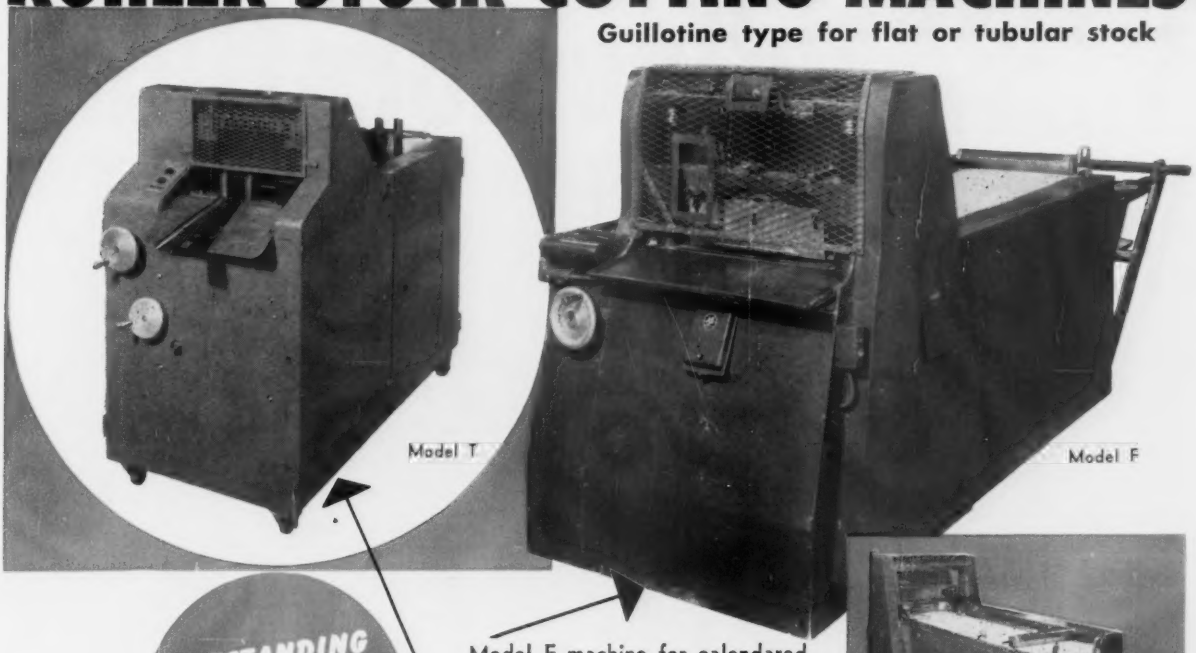
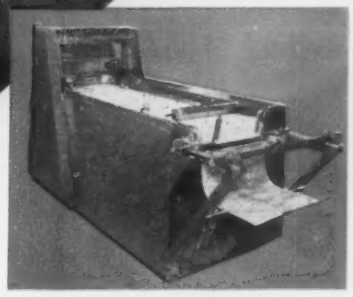


Model F machine for calendared or flat stock. Built in conveyor. Pivoting blade available for diagonal cuts.

Model T machine. Use with tubing machine or like. Continuous feed.

These machines can be seen in operation, anytime. Call for appointment.



Rear view of Model F machine.

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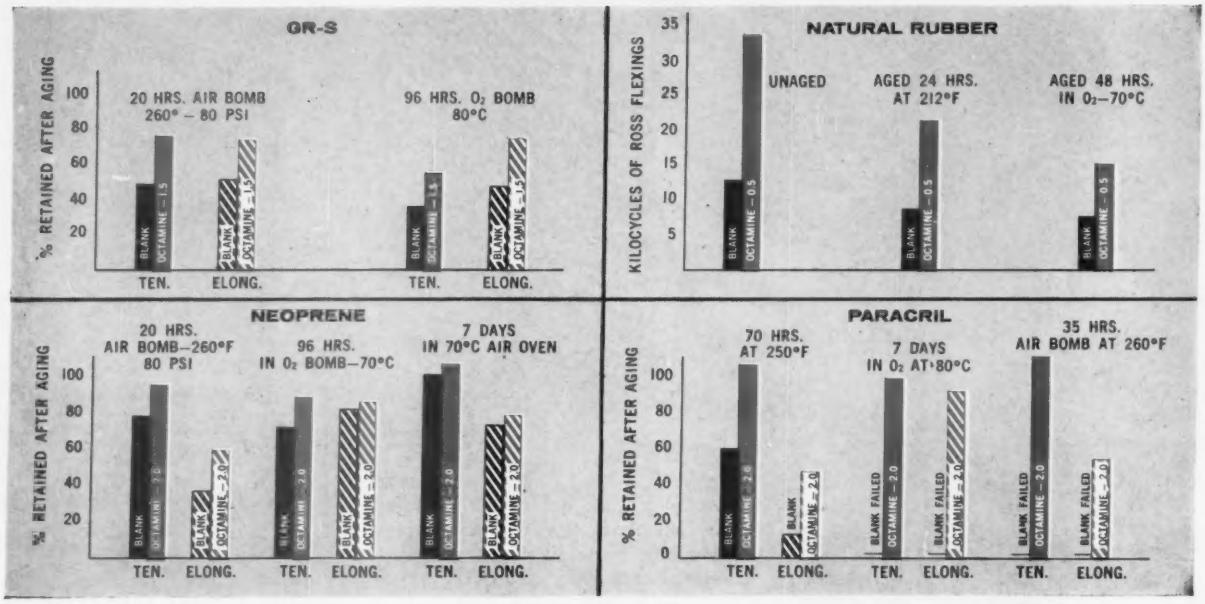

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Vulcanization of Rubber with High-Intensity Gamma Radiation

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Techniques of vulcanizing both natural and synthetic rubber polymers using high intensity gamma radiation are described. This process utilizes the gamma radiation from Cobalt 60 or spent uranium reactor fuel elements and is accomplished without heat or chemical vulcanizing agents. Reinforcing agents, antioxidants and other additives are still required however, to obtain an optimum balance of physical properties. After compounding the elastomers in the conventional manner and subjecting them to various dosages of gamma radiation, the resultant physical properties were determined. Evaluation of this technique shows considerable promise in developing elastomers for specialized uses, such as producing high temperature oil-resistant rubber compounds and for improving the compression set of specialized rubber compounds. This study further emphasizes the practical usefulness of atomic energy in providing the rubber technologist a new experimental variable or tool for determining fundamental properties of elastomeric compounds.

In spite of recent large scale investigations of new rubber polymers for many highly specialized Air Force applications, generally satisfactory elastomeric compounds have not yet been produced. These applications for the most part require rubber end items resistant to fuel, oil, synthetic base hydraulic fluids or lubricants at extremely high or low temperatures. It has therefore become necessary to increase the effort for new and improved compounding procedures and vulcanizing techniques for the existing polymers so that more satisfactory performance can be obtained from them.

Vulcanization of rubber was first discovered by Charles Goodyear in 1839. Since that time many refinements of this technique including the discovery and production of a wide variety of synthetic rubber polymers have followed. At the present time, the formulating and processing of natural and synthetic rubber constitute a highly developed art encompassing the use of numerous special compounding materials.

In accordance with most widely accepted theories, vulcanization is primarily a cross-linking process. This cross-linking is stated to occur at points in the rubber molecule which are reactive to such known vulcanizing agents and accelerators as sulfur, sulfur derivatives, metallic oxides, amines, etc., under the reaction conditions involving heat, time, amount and type of agent.

The fact that some materials can be vulcanized more readily under a given set of conditions than others is explained in terms of differences in the nature and structure of the polymeric molecule. Natural rubber, for example, contains unsaturation to an extent such that vulcanization by means of sulfur can be varied over a wide range. In the making of soft natural rubber goods the amount of sulfur used during vulcanization rarely exceeds 4%. Additional amounts up to as high as a maximum of 47% of its weight may be employed wherein complete saturation of the double bonds occurs and hard rubber or ebonite is formed.

TABLE I—COMPOUNDING DATA AND PHYSICAL PROPERTIES OF REPRESENTATIVE ELASTOMERS CONTAINING CONVENTIONAL AMOUNTS AND TYPES OF FILLER AND IRRADIATED AS INDICATED

Polymer	Parts	SRF	Philblack A	HAF Black	Dosage	Tensile (psi)	Elong. (%)	Hardness
Natural	100	45	—	—	4 x 10^7r	2600	320	40
Neoprene WRT	100	45	—	—	1 x 10^7r	2650	360	66
Hycar 1001	100	—	45	—	1 x 10^7r	2640	200	75
GR-S	100	—	60	—	1 x 10^7r	880	500	56
FBA[1]	100	—	—	35	1 x 10^7r	730	300	66
EA/AN/VTS[2]	100	—	—	35	1 x 10^7r	1730	220	71
Kel-F Elastomer	100	—	—	35	1 x 10^7r	1530	470	68
N5400[3]	100	—	—	35	1 x 10^7r	1330	170	60
Thiokol ST	100	45	—	—	1 x 10^7r	330	280	51
Silastic 250	100	—	—	—	1 x 10^7r	860	130	70

(1) Poly 1,1, dihydroperfluorobutyl acrylate. (2) Terpolymer of ethyl acrylate/acrylonitrile and vinyltriethoxy silane developed by Bjorksten Research Laboratories. (3) Experimental acrylate developed by Monsanto Chemical Company.

Reaction Mechanisms

At the present time, relatively few of the reaction mechanisms which are involved in the vulcanization of rubber are precisely understood. It is well known, however, that most variations from a given procedure markedly influence the final product.

It has been found, through this study, that uncured vulcanizable elastomers may be cross-linked in the absence of chemical vulcanizing agents and without the use of high curing temperatures. The products obtained closely resemble the chemical vulcanizates in many respects and offer considerable promise in developing elastomers for specialized uses. By subjecting the otherwise compounded base polymer to the action of a high energy gamma radiation source not only can the elastomer be cross-linked or vulcanized, but the extent of change produced can be controlled directly by adjustment of the radiation dosage.

This cross-linking effect has been noted by previous observers using other sources of irradiation such as X-ray, particle accelerators, etc. Davidson and Geib *(1)* noted a slight curing action of pile irradiation on natural rubber. Charlesby *(2)* through pile irradiation studies on certain elastomers has shown that the degree of cross-linking is directly proportional to radiation dose.

Gamma radiation is particularly desirable in this study for four reasons:

(1) High energy gamma rays have great penetrating power and, hence, the elastomers are vulcanized uniformly.

(2) The utilization of Cobalt 60 with proper shielding greatly reduces radiation hazards.

(3) No residual radioactivity is imparted to the treated elastomer.

(4) After initial installation of the source, together with the proper shielding, maintenance problems are limited as compared to those encountered with X-ray equipment or particle accelerators.

Although no effort is made in this study to determine the specific physico-chemical changes for each polymer, a review of the most recent concepts of the effects of atomic radiations on high polymers aids considerably in a more fundamental understanding of this process.

These effects as described by Sun *(3)* usually lead to one or more of the following: (1) Breaking of chemical bonds with free radical formation; (2) Dissociation or degradation of the molecule, and (3) Re-arrangement of the molecule. Consequently, chemical reactions are initiated. These include gas liberation, double bond formation and elimination, degradation, polymerization, cross-linking, vitrification, hydrogenation and others.

Initial studies included an evaluation of this gamma ray vulcanization technique with respect to the ability to vulcanize a wide range of rubber polymers. These polymers contained conventional amounts of filler to enhance their most useful properties. A comparison of heat aging characteristics of some compounds was made with those obtainable from similar compounds using conventional chemical vulcanization procedures.

Using four representative polymers compounded with varying amounts and types of filler, stress-strain changes and changes in other physical properties were noted over varying dosages of gamma radiation. The polymers included natural, GR-S, Neoprene WRT and Hycar 1001 (Buna N). The fillers used in 20, 40 and 60 parts by weight were Philblack A, MT Thermax, hard processing channel black, Silene EF and Kalvan. Gamma radiation dosages were 10^7, 3 x 10^7 and 4 x 10^7 Roentgens.

Volume swell and studies on plasticizer extractability were performed on gamma ray vulcanized Buna N compounds (Paracril 18) varying in types and amounts of plasticizers. These included dioctyl sebacate, TP90-B, tributoxyethyl phosphate and butyl oleate.

Compression set studies on Hycar 1001 compounds containing 0, 20 and 60 parts of Philblack A were also made using gamma dosages of 10^7 Roentgens.

A discussion of these results is found in the summary. Compounding formulas and test data are shown in the tables.

Irradiation Technique

Two sources of high energy gamma radiation employed in this study were Cobalt 60 and spent uranium fuel elements. Cobalt 60 is particularly desirable on the basis of its current availability and the simplicity of shielding which greatly reduces health hazards involved.

Portions of this work were conducted at the Materials Test Reactor at the National Reactor Testing Station. When spent uranium fuel elements are removed from the reactor they are usually stored in a deep water canal and allowed to "cool". These elements may be arranged to give a uniform gamma ray field above or inside the submerged fuel element assembly. The gamma fluxes from this source were determined calorimetrically, the average dose rate being 3 x 10^5 Roentgens per hour. The Cobalt 60 source used in this study is located at the Materials Laboratory, Wright Air Development Center.

The present dose rate is approximately 5.2×10^5 Roentgens per hour.

The radiation exposures of the elastomers have been expressed in calculated Roentgen values. The Roentgen unit is defined as essentially equivalent to the absorption of 83.8 ergs of energy from gamma radiation in one gram of dry air. For the same radiation field, the amount of energy absorbed varies with the material irradiated. For example, in the case of hydrocarbons the absorption value in a radiation field of one Roentgen is 93 instead of 83.8 ergs.

The dosages to which the elastomers were subjected were regulated by controlling the exposure time and thus were computed by multiplying the gamma flux in Roentgens per hour by the exposure time in hours.

Although temperatures above and below room temperature may be employed, the use of room temperature or thereabouts is preferred in view of the simplicity of operation. Temperatures were maintained at 30°C. to eliminate fluctuations and variations that could possibly be attributed to differences in temperature.

A sectional view of a conventional Cobalt 60 "pig" is shown in Fig. 1. A chain hoist is used for charging and removing the 1.69 inch diameter aluminum canister in which the aluminum molds are placed for irradiation. Fig. 2 shows the aluminum specimen molds for the elastomeric materials to be irradiated in the source. The over-all dimensions of the molds are 4 x 1 x 5/16 inches. The handling of samples is shown in Figures 7 and 8.

Compounding and Fabrication Technique

Using a standard 6-inch rubber mill, 100 parts of each polymer were premasticated to uniform breakdown. The fillers and/or plasticizers were slowly added and the mixture cut several times to insure homogeneity and sheeted off the mill at 0.050 ± 0.005 inches. The elastomer was then placed in the aluminum mold as shown in Fig. 2. Compression was maintained by Allen screws. The molds were then placed in the aluminum canister and loaded in the Cobalt 60 source as shown in Fig. 1.

The following general formulas were used for all stocks:

I

Polymer	100
Filler	0–60

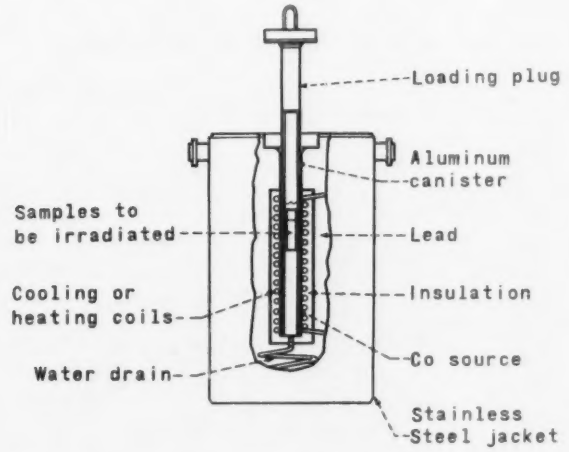

FIG. 1—Sectional view of a Cobalt 60 "pig".

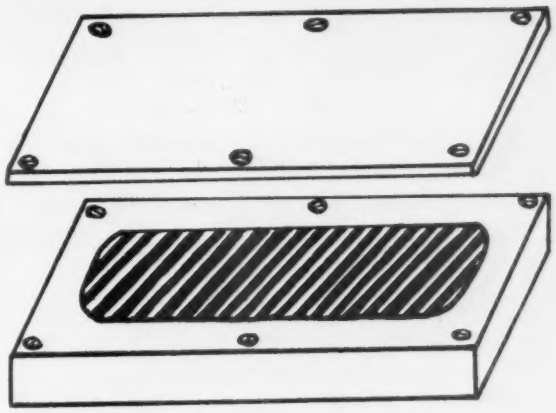

FIG. 2—Rubber specimen mold.

II

Polymer	100
Filler	0–60
Plasticizer	16, 26

The amounts used were based on a total of 100 parts by weight of polymer.

Testing Procedures

Physical Properties: Using standard test procedures as outlined in ASTM or Federal Specification ZZ-R-601a, tensile strength, elongation, modulus, hardness, compression set and volume swell in 70/30 isooctane-toluene mixture were determined.

Plasticizer Extractability: Tests for plasticizer extractability were conducted by determining the percent weight loss after immersion in 70/30 isooctane-toluene mixture for 96 hours at room temperature and dryout for 48 hours in air at 158°F.

Calculations for percent weight loss are as follows:

$$\frac{W_1 - W_2}{W_1} \times 100 = \%\ \text{Weight Loss,}$$

where W_1 = initial weight, and
W_2 = weight after immersion and dryout.

Summary of Results

Although the elastomers from this process appear to be modified in a manner closely related to the chemical vulcanizates in many respects, tests indicate that the modifications in most cases provide elastomers having improved aging characteristics.

Attempts to initiate vulcanization in polyisobutylene elastomers proved unsuccessful since polymers of this type readily undergo depolymerization at relatively low dosages of gamma radiation.

Many experimental polymers which offer considerable resistance to vulcanization by chemical means may be readily vulcanized by this process. A specific example of a polymer of this type is seen in Table II, wherein the response of N5400 elastomer (experimental acrylate developed by Monsanto Chemical Company) to irradiation is shown to be effective after relatively low dosage levels despite the fact that the particular polymer is greatly resistant to chemical vulcanization. A chemical vulcanizate was prepared after considerable difficulty and is shown for purpose of comparison with the irradiated product.

Comparative dry heat aging data at 350°F. between

TABLE II—COMPARATIVE HEAT AGING PROPERTIES OF GAMMA RAY VULCANIZED AND CHEMICALLY VULCANIZED N5400 ELASTOMERS

Gamma Ray Vulcanized		Chemically Vulcanized	
N5400	100	N5400	100.00
HAF	35	Stearic Acid	3.00
Gamma ray dosage	1 x 10^7r	Magnesium Oxide	2.00
		Ethyl Zimate	0.75
		Cure: 20 min. at 400°F.	
Original Properties			
Tensile (psi)	1330		1140
Elongation (%)	170		200
Shore A Hardness	60		60
Dry Air Aging at 350°F.			
embrittlement after 36 hours		embrittlement after 8 hours	
Properties after aging 72 hours in MIL-L-7808 engine oil at 350°F.			
Tensile (psi)	575		
Elongation (%)	60	embrittlement	
Shore A Hardness	85		

TABLE III—COMPARATIVE HEAT AGING PROPERTIES OF GAMMA RAY VULCANIZED AND CHEMICALLY VULCANIZED HYCAR 1001 ELASTOMERS

Gamma Ray Vulcanized		Chemically Vulcanized	
Hycar	100	Hycar 1001	100.0
Philblack A	35	Zinc Oxide	5.0
Gamma ray dosage	1 x 10^7r	Stearic Acid	1.5
		Sulfur	1.5
		Altax	1.5
		Philblack A	35.0
		Cure: 20 min. at 310°F.	
Original Properties			
Tensile (psi)	2640		2900
Elongation (%)	200		350
Shore A Hardness	75		84
Properties after aging 24 hours in MIL-L-7808 Engine Oil at 350°F.			

Both samples brittle; however, degree of brittleness substantially less in the irradiated vulcanizate on the basis of 180 degree flat bend test.

the two types of vulcanizates indicate a complete loss of rubberlike properties (embrittlement) of the chemically vulcanized N5400 elastomer in 8 hours while the gamma ray vulcanized product attained a similar condition in 36 hours. Oil aging properties at 350°F. in synthetic base diester oil also showed a definite superiority of the irradiated product. The chemical vulcanizate exhibited a complete loss of rubberlike properties in 24 hours. The physical properties of the irradiated product after 72 hours oil aging are shown in Table II.

Table III shows a Buna N (Hycar 1001) compound irradiated to a dosage of 10^7 Roentgens. Comparative dry heat aging data with a chemically vulcanized compound indicated a complete loss of rubberlike properties in both compounds after air aging 24 hours at 350°F. The degree of brittleness was substantially less in the

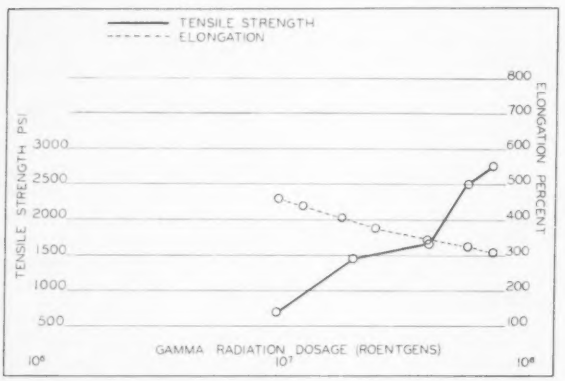

FIG. 3—Natural rubber plus 45 parts Philblack A.

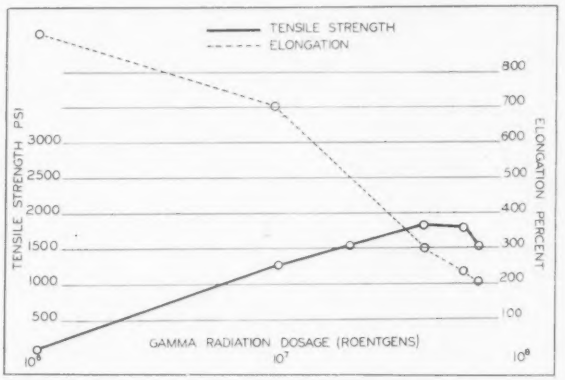

FIG. 4—GR-S plus 45 parts Philblack A.

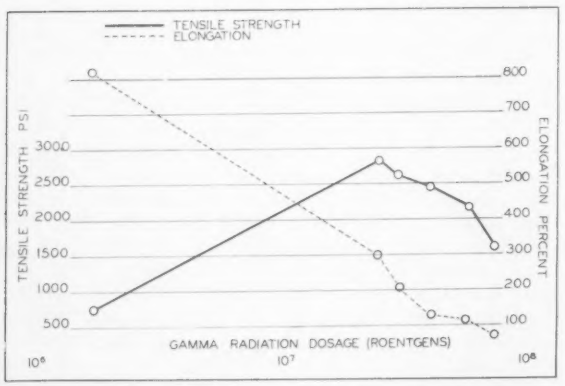

FIG. 5—Buna N plus 45 parts Philblack A.

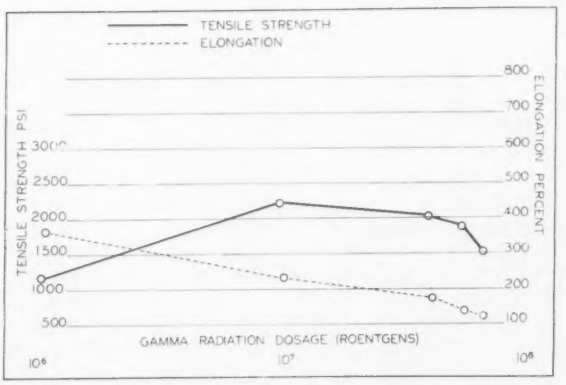

FIG. 6—Neoprene WRT plus 45 parts Philblack A.

TABLE IV—STRESS-STRAIN DATA FOR FOUR POLYMERS USING VARIOUS FILLERS

Polymer	Parts Filler per 100 of Polymer	150% Modulus (psi) after 3 Radiation Doses: 1×10^7r	3×10^7r	4×10^7r
No Filler				
Natural	—	54	108	120
GR-S	—	107	142	149
Neoprene WRT.	—	147	195	216
Hycar 1001	—	185	284	393
Philblack A				
Natural	20	178	153	184
	40	269	272	334
	60	500	538	383
GR-S	20	106	261	285
	40	158	457	724
	60	209	715	909
Neoprene WRT.	20	257	498	553
	40	665	1260	1970
	60	1182	2009	—
Hycar 1001	20	290	612	1020
	40	582	1610	2020
	60	1065	1620	—
MT Thermax				
Natural	20	65	102	110
	40	62	135	119
	60	81	211	172
GR-S	20	78	118	108
	40	82	129	192
	60	93	137	233
Neoprene WRT.	20	190	253	329
	40	141	335	511
	60	232	435	802
Hycar 1001	20	254	406	478
	40	278	636	723
	60	401	959	—
HPC (Channel Black)				
Natural	20	58	128	103
	40	198	273	307
	60	241	304	407
GR-S	20	98	146	186
	40	150	382	293
	60	358	602	585
Neoprene WRT.	20	252	456	1069
	40	662	890	—
	60	1070	—	—
Hycar 1001	20	367	665	635
	40	565	1320	1420
	60	725	2145	1960
Silene EF				
Natural	20	97	163	192
	40	91	164	209
	60	119	230	353
GR-S	20	98	170	159
	40	148	297	268
	60	249	549	459
Neoprene WRT.	20	260	—	—
	40	524	—	—
	60	852	—	—
Hycar 1001	20	254	539	492
	40	457	725	787
	60	742	1255	1090
Kalvan				
Natural	20	83	112	141
	40	99	133	279
	60	122	146	404
GR-S	20	88	164	139
	40	100	202	183
	60	108	185	278
Neoprene WRT.	20	175	—	—
	40	176	—	—
	60	337	—	—
Hycar 1001	20	233	372	600
	40	311	532	—
	60	433	799	—

TABLE V—TENSILE-ELONGATION PROPERTIES OF VARIOUS RUBBERS USING VARIOUS TYPES AND AMOUNTS OF FILLER

Filler	Parts Filler per 100 of Polymer	Tensile (psi), Elongation (%) after 3 Radiation Doses: 1×10^7r T	E	3×10^7r T	E	4×10^7r T	E
Natural Rubber							
Philblack A	20	256	200	630	390	307	390
	40	500	230	1845	400	1809	310
	60	702	310	2030	330	1690	290
MT Thermax	20	167	670	492	505	502	500
	40	217	620	750	475	1150	535
	60	410	545	1630	495	1995	545
HPC (Channel black)	20	139	445	612	280	738	430
	40	389	255	750	275	1050	235
	60	893	400	1630	210	1947	330
Silene EF	20	239	475	722	445	1042	191
	40	503	510	947	410	1517	209
	60	835	485	1465	420	1725	354
Kalvan	20	137	465	300	310	287	440
	40	249	490	780	450	725	405
	60	542	555	670	370	1607	420
GR-S							
Philblack A	20	393	1035	1047	410	935	320
	40	385	750	1055	340	1495	235
	60	343	580	1355	240	1360	190
MT Thermax	20	375	1345	650	1060	143	170
	40	298	1310	239	405	562	545
	60	334	1340	749	1080	730	585
HPC (Channel black)	20	480	1340	1000	725	812	395
	40	1035	855	2395	620	1430	470
	60	952	585	1730	365	1600	335
Silene EF	20	415	1160	592	635	471	465
	40	665	1040	1130	590	1240	770
	60	920	826	1330	440	1532	660
Kalvan	20	253	1195	340	495	357	680
	40	373	1270	406	485	386	620
	60	246	1370	710	990	903	635
Neoprene WRT							
Philblack A	20	2255	620	1595	305	1485	240
	40	2590	367	2300	210	1965	155
	60	2355	245	2160	155	2055	100
MT Thermax	20	1620	800	1320	640	440	195
	40	1580	890	1215	415	1000	235
	60	1880	950	1485	590	1222	210
HPC (Channel black)	20	1700	490	1150	275	1079	160
	40	2115	340	1345	175	1165	100
	60	2010	225	1570	100	1405	70
Silene EF	20	1045	655	489	100	334	70
	40	1090	390	685	80	550	50
	60	1150	285	855	60	570	20
Kalvan	20	492	525	310	130	279	60
	40	508	400	288	90	234	40
	60	1090	730	555	80	398	40
Hycar 1001							
Philblack A	20	1535	510	1250	200	1160	175
	40	2650	425	2680	210	2430	180
	60	2770	335	2430	210	2620	130
MT Thermax	20	870	460	562	190	470	155
	40	1185	525	1040	180	1060	190
	60	1575	625	1130	180	820	100
HPC (Channel black)	20	1430	640	1130	205	1850	255
	40	2025	630	2340	180	2380	205
	60	2715	545	3100	190	2930	195
Silene EF	20	1400	635	1145	270	1290	315
	40	1780	560	1610	300	1435	265
	60	2485	595	2220	305	2320	295
Kalvan	20	1125	620	1135	405	880	200
	40	1110	475	867	225	570	130
	60	2390	570	1212	250	1080	100

TABLE VI—COMPRESSION SET DATA FOR GAMMA RAY VULCANIZED AND CHEMICALLY VULCANIZED HYCAR 1001

Gamma Ray Vulcanized

	Compound No.		
	1	2	3
Hycar 1001	100.0	100.0	100.0
Philblack A	—	20.0	60.0
Gamma ray dosage		1×10^7r	
Compression Set (%) after 70 hours at 250°F.	20.2	55.5	53.0

Chemically Vulcanized

	4	5	6
Hycar 1001	100.0	100.0	100.0
Stearic Acid	1.5	1.5	1.5
Zinc Oxide	5.0	5.0	5.0
Sulfur	1.5	1.5	1.5
Altax	1.5	1.5	1.5
Philblack A	—	20.0	60.0
Cure: 35 minutes at 310°F.			
Compression set (%) after 70 hours at 250°F.	64.5	80.0	77.5

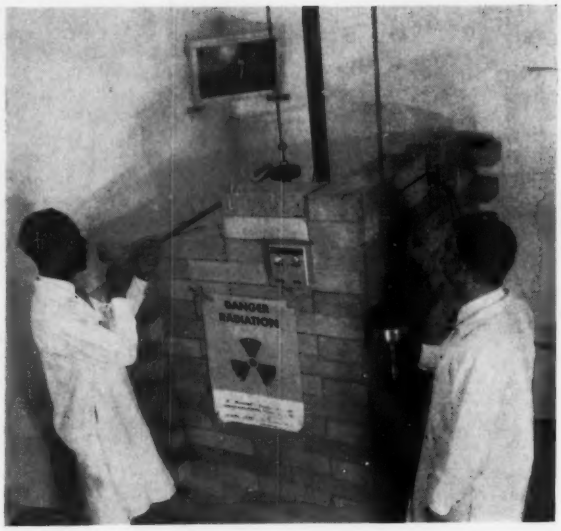

FIG. 7—Technique for loading rubber samples in Cobalt 60 source.

case of the irradiated vulcanizate, however, on the basis of a 180° bend test.

Figures 3 through 6 graphically represent the effect of gamma radiation dosages on the tensile strength and elongation of four representative elastomers consisting of natural, Buna N (Hycar 1001), Neoprene WRT and GR-S polymers. Each composition consists of 100 parts of the base polymer and 45 parts by weight of Philblack A. The response to specific dosages is seen to be not the same for the elastomers, supporting previous observations that polymers of differing chain lengths or those containing the benzene ring in their structure, etc., possess varying degrees of resistance to the effect of high energy radiation. The changes in tensile strength and elongation noted in these illustrations after increased gamma ray dosages closely follow those encountered using conventional chemical vulcanization procedures.

It has been found that dosages ranging from 10^7 and up to about 8×10^7 Roentgens may be employed for some elastomers. An effective dosage is within the range of 2×10^7 and 6×10^7 Roentgens. Optimum results for materials such as natural rubber and several of the synthetic elastomers are indicated at dosage levels of approximately 3 to 5×10^7 Roentgens.

As may be seen in Tables IV and V, different types and amounts of fillers also influence the rate and extent of change in physical properties of natural, neoprene, GR-S and Buna N rubber at various dosage levels.

Analysis of the stress-strain data noted in Table IV indicates certain changes which, in some respects, follow those encountered in conventional vulcanization procedures. The modulus at 150 percent of all the elastomers increases with increased concentration of filler and as the dosage within the range of 10^7 to 4×10^7 Roentgens is increased. Few exceptions are noted in some compounds showing a slight decrease in modulus at 4×10^7 Roentgens. In comparing the reinforcing properties of hard processing channel black with those of Philblack A, generally higher tensile elongation and modulus properties are noted in most compounds using Philblack A.

Further examination of the tensile-elongation properties of these four polymers (Table IV) indicates that as the concentration of filler is increased the tensile properties are increased. Certain irregularities are noted wherein the elongation also increases with increasing amounts of filler. Decreases in elongation are noted in a number of compounds as the gamma radiation dosage is increased within the range of 10^7 and 3×10^7 Roentgens.

Other unique physical and functional properties of elastomers prepared by this process are noted in the com-

TABLE VII—PLASTICIZER EXTRACTABILITY STUDIES ON GAMMA VULCANIZED PARACRIL 18 POLYMER CONTAINING FOUR PLASTICIZERS

Compound No.	1	2	3	4	5	6	7	8
Paracril 18	100	100	100	100	100	100	100	100
TP90B	16	26	—	—	—	—	—	—
Tributoxyethyl phosphate	—	—	16	26	—	—	—	—
Butyl oleate	—	—	—	—	16	26	—	—
Di-2 ethylhexyl sebacate	—	—	—	—	—	—	16	26
Philblack A	45	45	45	45	45	45	45	45
Percent weight loss after aging 96 hours in 70/30 isooctane-toluene at room temperature then dryout 24 hours at 158°F. after								
Gamma dose 4×10^7r	7.34	16.5	8.12	16.5	8.1	16	7.7	17.8
Gamma dose 6×10^7r	3.65	—	6.47	—	4.46	—	4.5	—

FIG. 8—Close-up view of Cobalt 60 source showing plug with canister in slightly elevated position.

pression set data shown in Table VI. Buna N elastomers containing 0, 20 and 60 parts of Philblack A were irradiated to a dosage of 10^7 Roentgens and the compression set results compared with similar chemically vulcanized Buna N elastomers. The compression set after 70 hours at 250°F. is seen to be considerably less in the case of the irradiated compounds.

Results of studies on limiting plasticizer extractability by fuel from a Buna N compound containing 10 and 15 percent of various types of plasticizers are shown in Table VII. Limitations in plasticizer extraction by 70/30 isooctane/toluene are observed, however, only after considerably high dosages of gamma radiation which to date have resulted in an unfavorable balance of physical properties. Table VIII shows a decrease in volume swell of similar compounds irradiated at dosages of 4 x 10^7 and 6 x 10^7 Roentgens. Comparative results of similar chemically vulcanized compounds are also shown in this table.

TABLE VIII—COMPARATIVE VOLUME SWELL DATA ON CHEMICALLY VULCANIZED AND GAMMA RAY VULCANIZED PARACRIL 18 COMPOUNDS

Chemically Vulcanized				
Paracril 18	100.0	100.0	100.0	100.0
Zinc oxide	5.0	5.0	5.0	5.0
Stearic acid	1.5	1.5	1.5	1.5
Sulfur	1.5	1.5	1.5	1.5
Altax	1.5	1.5	1.5	1.5
Philblack A	45.0	45.0	45.0	45.0
TP90B	17.5	—	—	—
Tributoxyethyl phosphate	—	17.5	—	—
Butyl oleate	—	—	17.5	—
Di-2 ethylhexyl sebacate	—	—	—	17.5
Cure: 20 minutes at 310°F.				
Volume Swell (%) after aging 70 hours at room temperature in 70/30 isooctane/toluene	46.0	42.1	43.0	45.0
Gamma Vulcanized				
Paracril 18	100.0	100.0	100.0	100.0
Philblack A	45.0	45.0	45.0	45.0
TP90B	16.0	—	—	—
Tributoxyethyl phosphate	—	16.0	—	—
Butyl oleate	—	—	16.0	—
Di-2 ethylhexyl sebacate	—	—	—	16.0
Volume Swell (%) after aging 70 hours at room temperature in 70/30 isooctane/toluene after				
Gamma dose 4 x 10^7r	37.2	38.5	38.4	43.0
Gamma dose 6 x 10^7r	35.2	28.0	35.1	35.6

The results of this study, while not conclusive, indicate areas for further investigation. While commercial feasibility of this process has not been studied yet, its usefulness in providing to the rubber and plastics industry a unique tool for obtaining fundamental information should be emphasized.

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Coming Next Month . . .

"The Reinforcement of Butyl and Other Synthetic Rubbers with Silica Pigments. Part II — Effect of Surface Modification of Silica and Subsequent Heat Treatment"—by A. M. Gessler, H. K. Wiese and John Rehner, Jr., Esso Research and Engineering Co.

The production of pure white compounds, such as are used in tire sidewalls, can be achieved by Butyl-silica compounds if the silica itself is chemically modified. The modifications involved and their effect on the corresponding polymer admixtures are outlined and discussed in detail.

"Progress in Foamed Latex Sponge"—by Bailey Bennett, Battelle Memorial Institute.

A review of progress in foamed latex sponge since World War II, particularly as revealed in publications of the past three or four years. Includes synthetic latices, foaming processes, molding and vulcanizing, gelation, reinforcement and other developments. Contains 103 references.

"Standard Natural Rubber"—by R. D. Stiehler and F. L. Roth, National Bureau of Standards.

Report of a study on the feasability of blending in a Banbury mixer "yellow" TC smoked sheets to prepare a uniform lot for a standard sample of natural rubber. Samples studied included those from 16 bales and 4 blends. Results indicate need for a reference standard in the classification of natural rubber production.

Abstracts of papers for the Rubber Division Meeting, Philadelphia, Penna., November 2-4, 1955.

BALATA—
Its Production, Possibilities and Uses

By LILLIAN COOK
Librarian, Rubber Division Library, University of Akron, Akron, Ohio

BALATA gum is obtained from a tree of the *Sapotaceae* family known as the *Mimusops Globosa (1)*. Balata contains no rubber but resembles impure gutta-percha *(63)*. Until recently in Venezuela, the trees were felled to facilitate collection of the latex. Now the trees are tapped as they always were in the Guianas *(2)*.

Balata is prepared in two manners. The Guianas produce sheet balata by drying thin layers of the milky juice in the sun. In Panama, Venezuela, and the Amazon districts the latex is heated until it coagulates and the plastic mass is pressed into blocks. Sheet balata is of a drier nature and better quality due to its method of preparation and the greater amount of supervision required. Block balata is used by golf ball manufacturers *(1)*.

Chemical Characteristics

Commercial balata is softer than gutta-percha, as it contains more of the softer resin *(2)*. These gums owe their value to the thermoplastic property of the hydrocarbon portion of the gum. The hydrocarbon is a hard mass which softens to a plastic condition when heated in boiling water and reverts to the original state when cooled *(1)*.

Light is very effective in inducing deterioration, particularly in the presence of air. Balata has a low absorption capacity for water and can best be protected by immersion in it *(57)*. The great difference between rubber and balata seems to be due to the fact that rubber contains a network of protein which becomes conducting in the presence of moisture, whereas washed balata contains no such network *(1)*. The insulating properties, water resistance, and thermoplastic properties gives balata great advantage when used for submarine cables *(1, 12, 13, 25, 35, 37, 38, 51, 57, 80)*.

In morphological studies, balata rubber shows no tendency to thread or form globules at room temperature. At higher temperatures, molecules seem to have a different configuration and threads and globs are observed which stiffen upon cooling. A permanent change from opaqueness to translucency occurs simultaneously *(54, 55)*.

X-ray analysis has shown that the hydrocarbons of gutta-percha and balata are identical, but differ from those of rubber *(56)*. A comparison between the physical properties of rubber and balata is given by the stress-strain curves. When loaded, balata elongates in a manner similar to a metal. High temperature makes balata behave like rubber, while low temperature makes rubber behave like balata *(75)*.

Resin-free balata reacts with sulfur in a manner similar to rubber *(81)*. Phenols, thiophenols, and active phenol resins may be used as vulcanizing agents *(21, 22)*. Electron microscopy has been used to suggest the nature of carbon black reinforcement in balata *(49)*. Protection against oxygen deterioration is obtained by adding a small proportion of an isobornyl derivative. The antioxidant does not discolor the rubber or stain lacquers or fabric on exposure to sunlight *(73)*. Vulcanized balata may even be reclaimed with an aliphatic polyamine *(32)*.

Balata may also be caused to react with sulfur dioxide in the presence of chlorine oxides. The reaction products may be brought into the form of threads or films *(44, 47, 48)*. Treatment with an alkaline substance makes the product at least partially water soluble and suitable for use as a wetting agent *(17, 39)*.

Major Applications

As mentioned before, the properties of balata make it quite suitable as an insulating material for submarine cables *(12, 13, 37, 38, 51, 80)*. Patents to this effect are dated as far back as the year 1862 *(9)*. After the turn of the century, attempts were made to improve the dielectric properties by mixing balata with Buna rubber. The mixtures had improved properties which were shown to be stable under actual service conditions over several years *(25)*.

Another major use for balata has been in the coverings for golf balls. For this purpose balata may be mixed with polymerized vinyl compounds, cured rubber, an aqueous dispersion of uncoagulated vulcanized rubber latex, or oxidized soybean oil *(43, 45, 68, 74, 76, 79, 93)*. The covering is applied in thin layers which are dried, cold-vulcanized, and molded *(26, 27)*.

Balata is included in several textile products as an adhesive and as a reinforcing agent. Laminated products of fabricated textile and felt, or two or more layers of felt, are made with balata as the adhesive. Laminated felt may be used for battery separators, heat and sound insulators, vibration damping materials, gaskets, and packings. Treated fabrics have increased resistance to wear, laddering, and creasing. Even some elastic fabrics are impregnated with balata *(6, 7, 8, 11, 19, 36, 78, 91)*. Balata may be mixed with a sticky, stretchable polyester to give a nonhardening adhesive for lamination of flexible plies *(15)*.

A mixture of balata and paraffin wax is used to coat paper, cellophane, or metal foil for use in packaging food *(23)*. Wrapping paper can be moisture-proofed with a similar mixture which makes an elastic, nontacky, and impervious coating *(30, 31, 58, 77)*.

Use in Belting

Although balata cannot stand great heat, it possesses good qualities when used for belting. Pure balata belting is free from shrinkage, resistant to stretch, has solid texture, great durability, and is steam- and water-proof *(90)*. Balata belts are used mainly in belt elevation installations at slow speed *(49)*. Friction tests show that

balata, when used with a softer rubber, is a good material to use where great strength is required as well as in places that have to stand abrasion or contact with a wearing surface *(40)*. This fact also makes balata useful as a fiber covering for driving ropes. The cover gives a frictional grip on the pulleys and transmits the drive from the core *(28)*.

There are a few miscellaneous products and uses worth mentioning. Balata may be substituted for the usual fillers to give strength and toughness to rubber compounds *(5)*. Rubber derivatives may be added to other unsaturated bodies, and the products may be used as varnishes and lacquers, or as starting points for other derivatives *(18)*. The thermoplastic character makes balata useful as a bonding medium between the liner and the plate element of a denture *(69)*. Frothed or unfrothed dispersions of balata are made into cellular articles such as cushions *(72)*.

Articles containing balata can be given a permanent hard smooth surface by immersing them in an acid substance containing a SO_3H group. They are then dipped in an alkaline bath and washed with water *(3)*.

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Dravo Intensive Mixer

Development of what is believed to be the most powerful mixing machine of its type for compounding rubber and plastics has been announced by the Process Equipment Department of the Dravo Corp., Neville Island, Pittsburgh 25, Penna. The pilot plant model of the new extra heavy-duty "Dravo Intensive Mixer" is being constructed for the U. S. Navy Department for experimental work on special rubber and plastic compositions. The machine has been designed for high power input and is of strong construction to handle a wide range of tenacious materials. Although it has a normal working capacity of only one gallon for an average batch of between four and six pounds of rubber or plastic material, the improved type mixer can be equipped with variable speed motor drives up to 50 hp.

Hunt Detachable Valve Coupling

C. B. Hunt & Son, Inc., Salem, Ohio, has announced completion of a new, locking, safety-type, quickly detachable valve coupling which is said to permit the operator to shut off air and change tools quickly and safely. After connecting the jaws of the valve half around the shoulder on the connection half, the operator advances the knurled brass sleeve to the "on" position. This permits the line air to flow through the sleeve and out through the line to the air-operated tool. Turning the sleeve to the right locks both the coupling and the valve in the "on" position, preventing accidental disconnection. Returning the knurled brass sleeve to the "off and exhaust" position exhausts the air in the tool to the atmosphere automatically and safely traps the line air in the sleeve.

The Reinforcement of Butyl and Other Synthetic Rubbers with Silica Pigments

Part I—Effect of Heat Treatment

By A. M. GESSLER and JOHN REHNER, Jr.
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SILICA pigments in synthetic rubbers can produce vulcanizate reinforcement very nearly equal to that obtained with carbon black. This paper describes methods which eliminate a principal disadvantage associated with the use of silicas, namely, excessive vulcanizate stiffness. Of equal importance, these methods are shown to yield vulcanizates with tensile strength, modulus, and abrasion resistance quite comparable to those obtained with channel blacks. This high degree of reinforcement is accomplished by (a) heat treatment of silica masterbatches, (b) chemical modification of the silica surface, and (c) combinations of these two procedures. Patents on this method of reinforcement are pending. A later paper will deal with subjects (b) and (c). The development is an important one because it has an immediate influence on the production of colored rubber goods, mechanical products and the like and, more noteworthy, on applications such as colored sidewalls and tire treads which require high abrasion resistance and strength.

Previous papers *(1-4)* have shown that the heat treatment of Butyl-carbon black mixtures leads to great improvements in the chemical and physical properties of the resulting vulcanizates. In this work, the specific action of oxygen on the carbon surface was reported, and it was demonstrated that non-oxy blacks, which do not respond directly to heat treatment, could be made to do so by the use of certain chemical promoting agents. The effect of carbon black concentration and, finally, the effect of polymer type were also considered. The results of heat treatment were explained in terms of a hypothesis which involves anchorage of polymer chains to the carbon surface through a process which not only disaggregates the black, but also provides opportunity for the disaggregated black particles to be closely associated with the polymer, and more particularly, with reactive sites on the polymer chains.

The above work naturally raised the question as to what, if any, improvements could be obtained from heat treating Butyl and other synthetic rubbers with non-black fillers. This appeared to be a particularly fruitful area for investigation because of the relatively poor properties which are normally associated with vulcanizates of this type. Heat treatment effects were found for many non-black fillers, as will be reported later. The most profound effects, however, were realized with hydrated silica, and, as has already been stated, it was with this filler that heat treatment produced reinforcing characteristics similar to those obtained with channel black. The material in this paper, therefore, will be concerned with silica which, due to its small particle size and high surface activity, is believed to respond to thermal interaction in much the same way as carbon blacks.

Compound

A fine particle, hydrated silicon dioxide (Hi-Sil 202) produced by the Columbia Southern Chemical Corporation was used in most of the work reported here. The physical and chemical properties of this pigment *(5)* are given in Table I.

Except where otherwise noted, Hi-Sil 202 was compounded with Butyl according to the following formulation:

MASTERBATCH	
Enjay Butyl 217	100.0
Hi-Sil 202	50.0
Stearic Acid	2.0
Glycerol	3.0
Chemical Promoting Agent	As Indicated

VULCANIZING AGENTS	
Zinc Oxide	5.0
Sulfur	2.0
Tellurium Diethyl Dithiocarbamate	1.0
Aromatic Thiazoles	1.0

The aromatic thiazoles used were 2-mercaptobenzothiazole or phenylaminomethyl 2-benzothiazyl sulfide. The masterbatch was mixed under standard conditions on a laboratory open mill. Heat treatment was carried

TABLE I — PHYSICAL AND CHEMICAL PROPERTIES OF HI-SIL 202

Color	White
Bulk Density, lbs./cu. ft.	8
Specific Gravity	1.95
Average Particle Size, microns	0.022
B.E.T. Surface Area, sq. m./gm.	150
Refractive Index	1.46
Oil Absorption, gms./100 gms. pigment	180
pH, 5% water suspension	7.5
Heat Loss, 105°C., %	5
Total Ignition Loss, 1200°C., %	10
% SiO_2	84
% CaO	1.0
% Fe_2O_3	0.3
% Al_2O_3	4.0
% NaCl	1.0

TABLE II — EFFECT OF HEAT TREATMENT ON THE TENSILE AND DYNAMIC PROPERTIES OF A BUTYL-HI-SIL VULCANIZATE

991-93		5C	5H
Modulus at (Lbs./In.²)	100%	165	200
	200%	200	500
	300%	255	1025
	400%	400	1640
	500%	665	2320
	600%	1300	2910
	700%	2090	—
Tensile Strength, Lbs./In.²		2545	3110
% Elongation		800	640
$\eta f \times 10^{-6}$, Poises x C.P.S.		6.35	2.34
$K \times 10^{-7}$, Dynes/Cm.²		10.90	7.79
% Relative Damping		37.90	21.40
300% Modulus Increase, %		—	302
Tensile Strength Increase, %		—	22
ηf Decrease, %		—	63
K Decrease, %		—	29

out on the same mill at 300 to 310°F. for times which varied from 10 to 40 minutes, depending on the masterbatch. Vulcanizing agents were added finally on the cool mill and vulcanizates were cured for 45 minutes at 307°F.

Heat Treatment

General—Procedure and Effects: Because of the extremely hygroscopic nature of Hi-Sil, masterbatches containing this pigment can not be heated in open steam as was the case with carbon blacks *(1)*. Water is absorbed very rapidly and the batch quickly loses all cohesive strength. Heat treatment is best carried out dynamically, on an open mill or in the Banbury, employing a chemical promoting agent. In general, these are the same agents which were used in the heat treatment of furnace blacks *(2)*. The response with Hi-Sil, however, is much sharper, and careful selection of both the agent and its concentration must be made.

Unlike the case with carbon blacks, heat treatment of the masterbatch results initially in an apparent scorching of the stock. During the first few minutes on the hot mill, the stock becomes tough, short, and dry. "Lacing" may be severe and, in the worst cases, the band may come free from the mill roll and have to be forced manually back to the nip of the mill. If the concentration of chemical promoting agent is properly selected, however, this scorched condition is not permanent.

On continuation of the hot milling, the stock becomes smooth again. It first softens so that it can be banded tightly on the mill roll, and finally the "lacing" and surface roughness disappear. The time which is required on the open mill to complete this cycle varies with the promoting agent and its concentration. Apparent scorching is much less severe if stearic acid is not added to the masterbatch before heat treatment, but rather with the vulcanizing agents after heat treatment. The operation goes quickly and easily in the Banbury, as will be shown later.

The heat treatment of Butyl-Hi-Sil systems results in vulcanizates with greatly increased tensile strength, modulus, and resilience and sharply reduced stiffness, permanent set, and extensibility. Though it is desired to discuss these points separately, and in much greater detail, data in Table II give a general picture of the effects which are obtained when a masterbatch with one part of quinone dioxime dibenzoate is hot milled for 20 minutes at 310° F. In the table, 5C and 5H refer to the compound before and after heat treatment, respectively. ηf and K are dynamic properties measured with the modified Yerzley oscillograph *(6)*. The test determines the internal viscosity, η, of the vulcanizate at frequency f; the product, ηf, is an absolute damping term describing the energy lost as heat, and is therefore inversely proportional to resilience. K is the dynamic modulus. The changes indicated at the end of the table are those resulting from heat treatment.

Figure 1 shows the effect of a few chemical promoting agents on the modulus of Butyl vulcanizates prepared from thermally interacted Hi-Sil masterbatches. G.M.F. (p-quinone dioxime) and Polyac (p-dinitrosobenzene, 30% in inert filler) are very active, and in these cases mixtures with more than 0.5 part (per 100 of polymer) of the agent are so severely scorched during the first few minutes on the hot mill that further handling is impossible. Mixtures with Dibenzo G.M.F. (p-quinone dioxime dibenzoate) tend to scorch much less than those with G.M.F. or Polyac and it is with systems containing Dibenzo G.M.F. that the best physical properties have been obtained to date. Tuads (tetramethyl thiuram disulfide), benzidine, and hexamethylenetetramine are not effective in producing a heat treatment response.

As was the case with carbon blacks *(2)*, chemical promoters appear to cause an interaction between the pigment and the polymer. Little or no effect is obtained if the polymer and promoting agent alone are hot milled before the filler is added (Figure 2). Correspondingly, a relatively small effect is realized if the polymer and pigment are hot milled without promoting agent. Thus, evidence is again found to support the contention that reinforcement, in part at least, is the result of chemical bonding between the filler and the polymer. More will be said about this later.

The effect of time of hot milling has not been thoroughly investigated. The data in Table III, however, show that hot milling leads, in the raw stock, to a steady decrease in Mooney viscosity. In the vulcanizate, a maximum modulus and a minimum elongation are obtained in roughly 10 minutes. The decreased Mooney and the

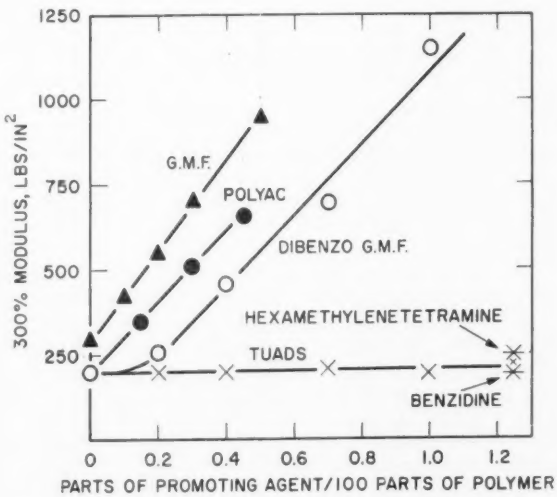

FIG. 1—Effect of various chemical promoting agents on modulus of heat-treated Butyl-Hi-Sil compounds. (Masterbatches milled 10 minutes at 310°F.).

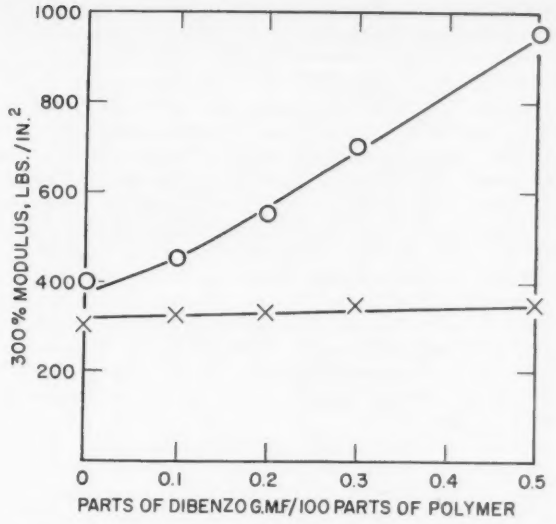

FIG. 2—Effect of Dibenzo G.M.F. concentration on modulus of heat-treated Butyl compounds. (The circles and crosses refer to masterbatches heat treated with and without Hi-Sil, respectively. Hi-Sil added after heat treatment in latter case.)

regression of modulus and elongation from their optimum values are believed to result from polymer breakdown through the action of oxygen.

Adsorption and the Use of Glycerol: Precipitated silicas such as Hi-Sil contain about 5 per cent bound water which is held on the surface as hydroxyl groups *(7)*. These hydroxyl groups produce a very active surface on which vulcanization accelerators may be adsorbed. The increased vulcanization rate and the higher modulus and tensile strength resulting in GR-S-Hi-Sil systems which also contained diethylene glycol *(8)* have been demonstrated. Hausch *(9)* studied the adsorptive nature of silica and found that the addition of glycols or amines to silica was effective in retarding the adsorption of malachite green. Thus, by adding these materials in mixtures of Hevea and silica, he was able to reduce the extent of accelerator adsorption and thereby to obtain improved vulcanizates.

Unlike the previous work with natural rubber and GR-S, in which heat treatment was not applied, the use of glycerol in the present instance does not greatly improve the properties of conventionally mixed Butyl-silica compounds (compare columns 1 and 2, Table IV). This failure to improve vulcanizate quality therefore suggests that a change in accelerator adsorption is not a significant factor in the present case. Glycerol, however, appears to activate the thermal interaction of Butyl and silica,

TABLE III — EFFECT OF TIME OF HOT MILLING ON CHEMICALLY PROMOTED BUTYL-HI-SIL COMPOUND

991-71		1				
991-79		—	1	2	3	4
Time of Hot Milling, Min.*		0	5	10	20	35
Modulus at	100%	155	165	120	100	100
(Lbs./In.²)	200%	210	480	500	400	340
	300%	330	870	950	780	690
	400%	550	1350	1450	1265	1145
	500%	1000	2025	2040	1900	1740
	600%	1740			2550	2375
Tensile Strength, Lbs./In.²		2170	2300	2500	2730	2600
% Elongation		670	560	590	640	650
Mooney Viscosity (3′ at 100°C.)		—	146	133	122	109

* Milled at 300 to 310°F.

particularly in the presence of a promoting agent like Dibenzo G.M.F.

Columns 3 and 4 in Table IV compare the tensile properties of a Butyl-Hi-Sil system in which glycerol was added after and before unpromoted heat treatment, respectively. The greater response of the latter system in this case can not be attributed to differences in accelerator adsorption, but must somehow be associated with an activation of the thermal interaction process. This effect becomes even more pronounced if the heat treatment is promoted with Dibenzo G.M.F. Data in columns 5, 6, and 7 illustrate this point. The compounds used in the work of Table IV contained 60 parts of Hi-Sil per 100 parts of polymer. For heat treatment, masterbatches were milled 30 minutes at 300 to 310°F.

The effect of glycerol concentration in the masterbatch (before heat treatment) has been studied. Tensile strength and modulus are increased as the concentration of glycerol is carried up to 3 to 5 per cent on the polymer. No advantage is gained by going to higher concentrations.

Effect of Silica Concentration: As has already been stated, the use of chemical promoting agents with Hi-Sil requires careful control if the maximum heat treatment response is to be obtained. Increases in the concentration of Hi-Sil must be accompanied by increases in the concentration of promoting agent. This is a very different situation than that encountered with carbon blacks where, say 0.2 per cent of sulfur (based on the polymer) was effective in promoting heat treatment over a wide range of black concentrations *(2)*. Mixtures with carbon black did not scorch or become outwardly rough during heat treatment, and in all probability, due to the lesser reactivity of furnace and thermal carbons as compared to

TABLE IV — EFFECT OF GLYCEROL IN CONVENTIONALLY MIXED AND HEAT-TREATED BUTYL-HI-SIL COMPOUNDS

	Cool Mixed	Heat Treated		Heat Treated		
Chemical Promoter	None	None		1.5 Dibenzo G.M.F./100 Polymer		
Glycerol	No	Yes	Yes	No	Yes	Yes
Glycerol Added		After H.T.	Before H.T.		After H.T.	Before H.T.
Modulus at 300%	325	300	410	870	950	1220
(Lbs./In.²) 500%	840	735	1200	1905	2100	2450
Tensile Strength, Lbs./In.²	2185	1750	2200	2460	2370	2700
% Elongation	820	780	740	675	580	580

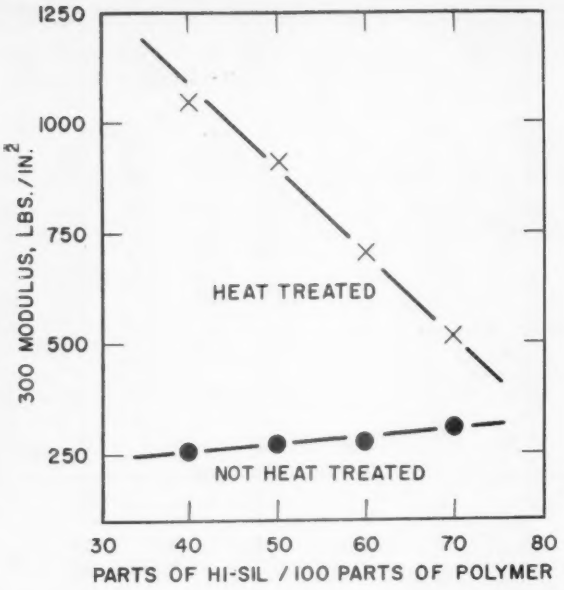

FIG. 3—Effect of Hi-Sil concentration on modulus of heat-treated Butyl compounds containing fixed amount of promoting agent.

hydrated silicas, there was always an excess of promoting agent present. This fact would account for the efficacy of the process, i.e., the direct proportionality between heat treatment response and black concentration *(2)*.

Figure 3 shows that in Butyl systems with a fixed amount of Dibenzo G.M.F. (1 part per 100 of polymer) the heat treatment response decreases as the concentration of Hi-Sil is increased. This is an unexpected result which shows modulus decreasing (in thermally interacted compounds) as more reinforcing filler is used. Perhaps the promoting agent is adsorbed on the silica surface and thus rendered incapable of forming attachments between the polymer and the filler. At higher loadings of Hi-Sil, the concentration of free or unadsorbed Dibenzo G.M.F. would therefore be lower, and reduced heat treatment effects might be anticipated.

The study of the effect of silica concentration was extended to include a more detailed consideration of the promoting agent requirements. Figure 4 shows the change in vulcanizate modulus which results from varying the concentration of Dibenzo G.M.F. in thermally interacted Butyl systems with 40, 50, and 70 parts of Hi-Sil, respectively. The data indicate that, for maximum thermal interaction response, the requirement for Dibenzo G.M.F. increases with the concentration of silica. An optimum point is found in each case and a line (dashed) through these points yields modulus values which, like the curves for carbon black systems, are proportional to the filler concentration. Comparison of this line with the lower line in Figure 3 shows also that the heat treatment response in this case is larger when more Hi-Sil is used in the compound. Masterbatch in this work was hot milled for 30 minutes at 300 to 310°F.

Silica Pigment and Rubberlike Behavior: According to a leading silica manufacturer *(10)*, the main objection to the use of silica in natural and synthetic rubbers is the stiffness which results in the vulcanizate. Butyl conventionally mixed with 50 per cent or more of Hi-Sil is boardy. If a strip of the vulcanizate is extended, there is an initial necking at one point. Continued application of the extending force causes the necked area to grow, stock being pulled away progressively from the adjacent wider portions of the strip, until the whole extended area is uniformly thin. All this happens at low extensions, up to 20 or 30 per cent, with the result that unusually high stress is obtained. The thinning out of the strip is permanent, that is, the deformation is almost completely non-elastic, a condition which leads to high set. This phenomenon, it is believed, is caused by an easily disrupted structure resulting from pigment-particle cohesion. Forces which bind silica particles together are broken as the sample necks during early extension, and the disruption of this structure gives rise to the high stresses mentioned previously. These cohesive forces are not restored on release of the applied stress because movement of the pigment particles is restricted by the entangled network of the matrix polymer. This hypothesis can be used to explain the high permanent set or non-recoverable deformation.

Heat treatment of silica-Butyl systems eliminates the undesirable cohesive pigment structure in the vulcanizate. This is particularly true if a chemical promoting agent is used. Butyl-Hi-Sil vulcanizates prepared from heat-treated masterbatch are not stiff or boardy. Their extension produces a uniform thinning along the entire extended area. There is no localized necking. Stress at low strains is low, and the deformation, being predominantly elastic, is recoverable to the extent that normal or low set is obtained. The total effect is one of greatly increased elasticity, and in this respect the apparent improvement is even greater than was the case with similar carbon black systems.

Figure 5 illustrates the properties which have just been described. These are cyclic stress-strain curves for continuous extension and retraction cycles. A_1 and A_{22} refer to conventionally mixed Butyl-Hi-Sil systems on the 1st and 22nd cycles, respectively. B_1 and B_{22} refer to corresponding heat-treated systems under the same conditions. Stiffness in the conventionally mixed sample (A_1) is evident in the high initial stresses resulting from cohesive pigment structure, the large hysteresis loop, and the considerable permanent set obtained on the first extension-retraction cycle. Repeated extensions and retrac-

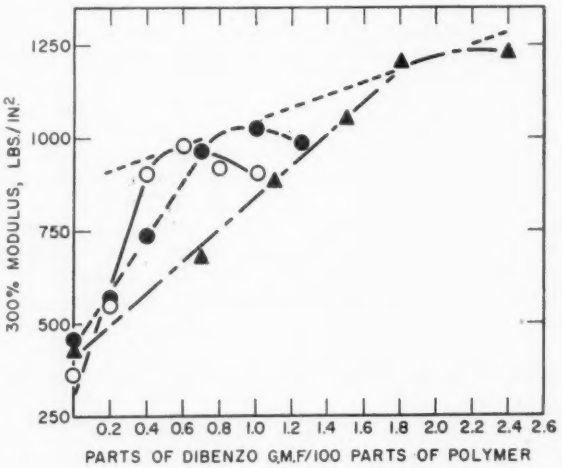

FIG. 4—Effect of Dibenzo G.M.F. concentration on modulus of heat-treated Butyl compounds containing 40, 50, and 70% Hi-Sil, respectively. [The open and closed circles and the triangles refer to systems with 40, 50, and 70 parts (per 100 parts polymer) of Hi-Sil, respectively.]

tions for as many as 22 cycles result in a considerable softening of the stress-strain curve (A_{22}) but do not lead to disappearance of the hysteretic effect or the set. The final set, given by the displacement of the 22nd cycle loop along the abscissa, is 40 to 45 per cent.

In contrast, the heat-treated system gives a normal stress-strain loop (B_1) which displays considerably less permanent set and hysteresis. Repeated extension and retraction, furthermore, gives relatively little shift in the curve (B_{22}). The total set shown on the abscissa in this case is only 5 to 10 per cent.

The compounds of Figure 5 were prepared with 60 parts of Hi-Sil per 100 parts of polymer. Two parts of Dibenzo G.M.F. were included in the masterbatch which, in the case of the heat-treated sample, was milled for 30 minutes at 300 to 310°F. Cyclic stress-strain measurements were made on a Scott Model IP-2 inclined plane tester. Similar results were obtained in Butyl systems with 40, 50, and 70 parts of Hi-Sil.

Blanchard and Parkinson *(16)* have studied the softening of reinforced rubber by prestressing and have proposed that this softening is due to the breakage of attachments between filler and rubber. According to the above workers, attachments between filler and rubber are of two kinds: (1) weak (van der Waals) type linkages which are readily broken by prestressing, and (2) strong, chemisorptive linkages which are not broken by prestressing. If this proposition is accepted, it must be concluded from Figure 5 that heat treatment greatly increases the strong attachments between polymer and filler, i.e., between Butyl chains and the Hi-Sil surface.

The number of weak linkages, on the other hand, appears to be reduced. These weak linkages, we believe, not only bind pigment to polymer but also pigment to pigment, and thus are responsible for the undesirable cohesive pigment structure mentioned earlier. The association of polymer chains with pigment clusters produces severe molecular restriction and results, at low strain, in the stiffness and high stress found in conventionally mixed samples. The role of heat treatment, therefore, is to substitute strong linkages for less desirable weak linkages and, in the process *(1)*, to obtain a much more discrete pigment dispersion.

Effect of Polymer Unsaturation and Molecular

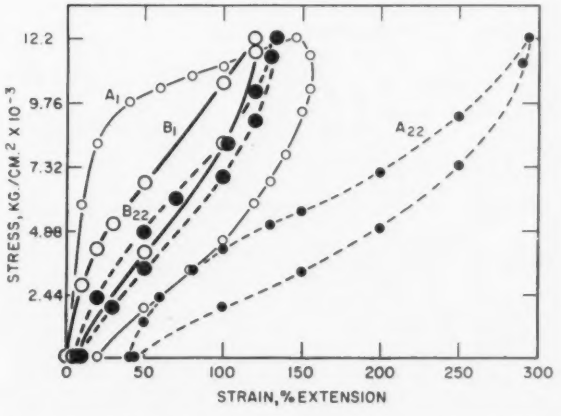

FIG. 5—Cyclic extension-retraction curves for Butyl-Hi-Sil compounds before and after heat treatment. (The light and heavy lines refer to systems before and after heat treatment, respectively. The solid and dashed lines refer to the 1st and 22nd cycles, respectively.)

TABLE V — TENSILE PROPERTIES OF SILICA COMPOUNDS VARIOUSLY PREPARED WITH EACH OF FIVE BUTYL POLYMERS

Polymer	Preparation	300% Modulus (Lbs./In.²)	500% Modulus (Lbs./In.²)	Tensile Strength (Lbs./In.²)	% Elongation
Enjay Butyl 035	1	———	———	———	———
Mol.Wt. 325,000	2	300	775	2350	790
Unsat. 0.9	3	750	1850	2650	660
Enjay Butyl 150	1	260	630	2490	780
Mol.Wt. 310,000	2	380	1075	2415	670
Unsat. 1.3	3	900	2075	2880	620
Enjay Butyl 217	1	270	715	2590	750
Mol.Wt. 445,000	2	420	1250	2360	650
Unsat. 1.5	3	1330	2735	2900	530
Enjay Butyl 218x	1	290	775	2800	725
Mol.Wt. 1,000,000	2	385	1090	2715	680
Unsat. 1.2	3	1670	....	2765	480
Enjay Butyl 325	1	390	1050	2020	640
Mol.Wt. 325,000	2	545	1575	1825	545
Unsat. 1.9	3	1450	....	2270	420

NOTES

Preparation 1—Cool mixed only.
Preparation 2—Hot milled 20 minutes at 310°F., no chemical promoter
Preparation 3—Hot milled 20 minutes at 310°F., 1.0 part Dibenzo G.M.F./100 Polymer

Weight: Table V gives the tensile properties of silica systems prepared with each of five different Butyl polymers. Each polymer system was subjected to (a) cool or conventional milling only, (b) unpromoted heat treatment, and (c) promoted heat treatment.

Hot milling Butyl-silica mixtures in the absence of a chemical promoting agent produces a vulcanizate with slightly increased modulus, in the order of 100 to 150 lbs./in.² at 300% extension, and with reduced tensile strength and extensibility. These minor changes may result from driving water off the pigment for, as will be shown later, a similar result is obtained if Hi-Sil is mildly calcined before being conventionally mixed with Butyl. Nevertheless, this unpromoted heat treatment yields vulcanizates with greatly increased flexibility, ηf being reduced as much as 50 per cent. Surprisingly, when Hi-Sil is calcined, no such reduction in ηf or increase in flexibility is obtained. It is suspected that this difference is somehow related to the various forms of water or hydroxyl groups which are desorbed or torn away from the silica surface at different temperature levels.

In the presence of promoting agent, the heat treatment response of Butyl-Hi-Sil systems is dependent on both the molecular weight and unsaturation of the matrix polymer. Data are not extensive enough to permit the consideration of molecular weight without variation in polymer unsaturation. The collective effect of these properties, however, taken arbitrarily as the product of molecular weight and unsaturation, can be shown. The solid line in Figure 6 gives the relation between this product and the increase in 300% modulus resulting

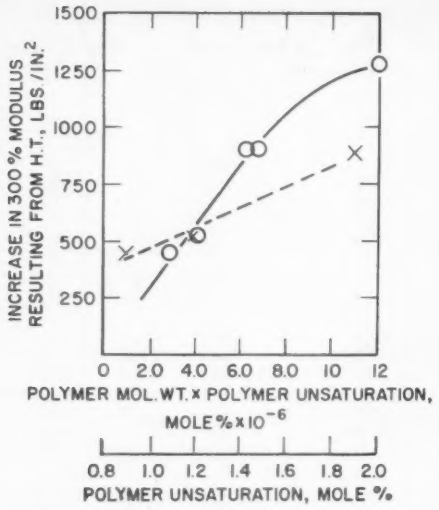

FIG. 6—Effect of polymer unsaturation and molecular weight on the heat treatment response of Butyl-Hi-Sil compounds.

from promoted heat treatment. The desirability of high molecular weight and high unsaturation is thus indicated. Taking polymers with the same molecular weight, approximately 325,000, a direct proportionality can be shown between polymer unsaturation and heat treatment response (dashed line in Figure 6). Molecular weight in this work was taken as the viscosity average molecular weight in diisobutylene at 25°C. Unsaturation was determined by the iodine-mercuric acetate method *(11)*.

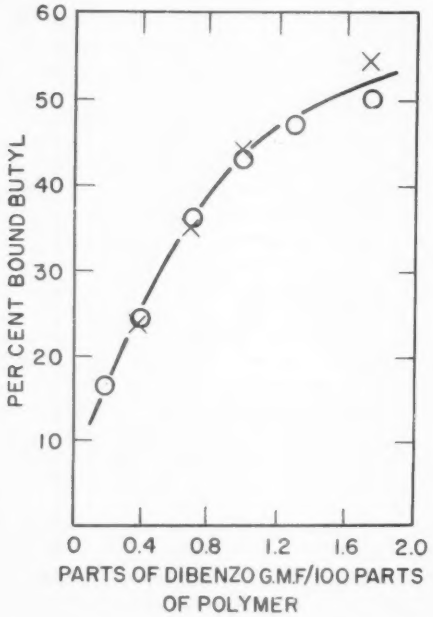

FIG. 7—Effect of Dibenzo G.M.F. concentration on bound Butyl formation in heat-treated Butyl-Hi-Sil compounds. (The circles and crosses refer to systems with and without glycerol, respectively.)

Association Forces Between Silica and Polymer

The effect of heat treatment on the bound rubber content of Butyl-silica mixtures was investigated. Hot milling Butyl with varying concentrations of Dibenzo G.M.F. and adding Hi-Sil afterwards produced masterbatches with no bound Butyl. Similarly, Butyl and Hi-Sil alone did not develop gel on hot milling. The insoluble polymer in Butyl-Hi-Sil systems after hot milling with varying concentrations of Dibenzo G.M.F. increased with the concentration of the promoting agent (Figure 7). These results suggest that Butyl and silica are somehow bound through the action of the oxime, the term "bound" being used here in the most general sense to include both physical and chemical bonds. Neither Hi-Sil nor Dibenzo G.M.F. alone in Butyl can produce bound or gel polymer. Points are given in Figure 7 for systems with and without glycerol. It is surprising that the activating action of glycerol, which has already been mentioned and is demonstrated for these particular compounds in Figure 8, does not lead to higher gel in the masterbatch.

The increases in vulcanizate modulus resulting from the heat treatment of Butyl-Hi-Sil systems are assumed, as was the case with carbon blacks *(1-4)*, to accrue from the formation of linkages between the polymer chains and the silica particle surface. These linkages, it is believed, are formed through hydroxyl groups on the silica. A precipitated silica such as Hi-Sil contains 10 per cent or more of water held as free or adsorbed water and as bound water which exists in the form of hydroxyl ions held on the particle surface *(12)*. It is these hydroxyl ions, held to silicon ions located in the next layer by primary valence forces *(13)*, which account for the colloidal properties of silica and which, we believe, are involved in the thermal interaction process.

Some workers *(14)* consider bound water as the water retained after silica is heated at 110°C. With a pigment like Hi-Sil this is a questionable assumption since, due to the large surface area and internal porosity, there is a good possibility that free water will be held at tempera-

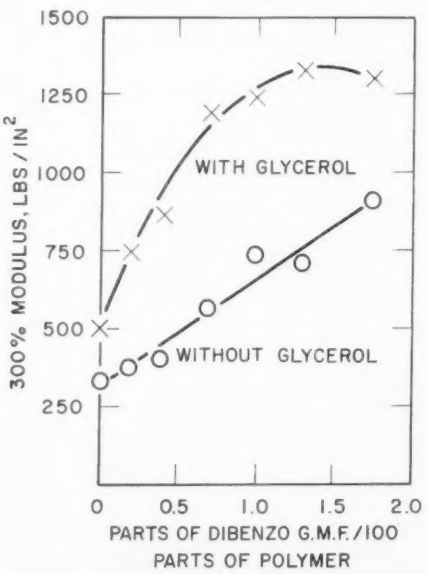

FIG. 8—Effect of glycerol on modulus of Butyl-Hi-Sil compounds heat treated with varying amounts of Dibenzo G.M.F.

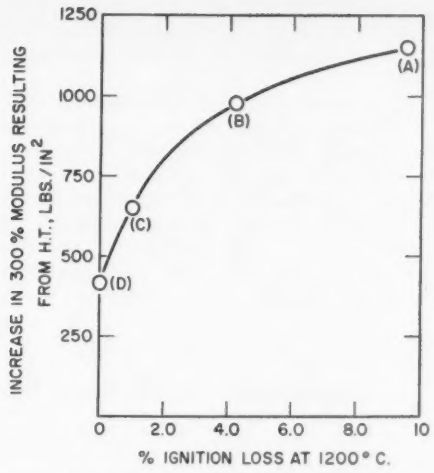

FIG. 9—Effect of total water content of Hi-Sil on heat treatment response of Butyl compounds.

tures up to the critical temperature of water (374°C.) by capillary condensation. Work is in progress in these laboratories to determine the extent of free and bound water in Hi-Sil and to relate these properties to the thermal interaction process. Unfortunately, this work does not yet permit definite conclusions.

It may be shown, however, that the heat treatment response is greater as the total water content of Hi-Sil is increased. In Figure 9 the increase in 300% modulus resulting from heat treatment (promoted with 1.0 part of Dibenzo G.M.F. per 100 polymer) is plotted against the ignition loss obtained with three Hi-Sil 233* samples—standard Hi-Sil 233 (A) and Hi-Sil 233 after calcining for 16 hours at 200°C. (B) and 700°C. (C). The final point (D) in Figure 9 shows the corresponding change obtained with an essentially anhydrous silica obtained from a different source, and reported to be prepared from silicon tetrachloride.

Bound Butyl determinations on these masterbatches revealed that the gel content resulting from heat treatment was also proportional to the water content of the silica. Gel contents of 43.3, 38.4, and 34.8 were obtained for Butyl systems containing standard Hi-Sil 233, Hi-Sil 233 calcined at 200°C., and Hi-Sil 233 calcined at 700°C., respectively.

* An improved silica announced recently by Columbia Southern Chemical Co. to replace Hi-Sil 202.

TABLE VI — EFFECT OF BANBURY HEAT TREATMENT WITHOUT PROMOTING AGENT

Time in Hot Banbury, Min.		5	10	20	30
Modulus at 100%	185	190	185	190	185
(Lbs./In.²) 200%	230	270	290	305	320
300%	290	350	425	465	490
400%	410	525	705	740	785
500%	730	1010	1300	1300	1375
600%	1405	1850	1950	1840	1850
700%	2160	2275	—	—	—
Tensile Strength, Lbs./In.²..	2475	2350	2220	2160	2115
% Elongation	775	710	675	685	670

TABLE VII — EFFECT OF BANBURY HEAT TREATMENT WITH PROMOTING AGENT

Time in Hot Banbury, Min.		5	10	20	30
Modulus at 100%	210	310	290	230	220
(Lbs./In.²) 200%	380	840	600	465	440
300%	615	1300	1000	845	820
400%	870	1775	1485	1350	1340
500%	1280	2330	2110	1980	1940
600%	1940		2800	2630	2525
700%	2725				
Tensile Strength, Lbs./In.²..	3075	2875	2870	2850	2800
% Elongation	755	595	610	645	650
$\eta f \times 10^{-6}$, Poises x C.P.S. ..	7.02	4.25	3.34	3.04	2.84
$K \times 10^{-7}$, Dynes/Cm.²	15.7	10.8	8.91	8.16	7.78
% Relative Damping	30.4	27.2	26.1	25.9	25.5

Banbury Trials

The thermal interaction of Butyl-Hi-Sil systems is most easily carried out in a Banbury. Tables VI and VII give data obtained from compounds prepared in the 00 Banbury with and without addition of Dibenzo G.M.F. As in the case of hot milling, only minor changes result from unpromoted heat treatment (Table VI). With promoter, however, the response is rapid (Table VII). Even the control is characterized by high modulus and tensile strength (compare Columns 1 in Tables VI and VII). This is due to the fact that the preparation of masterbatch in the Banbury involves temperatures up to 300°F., rather than the 130 to 160°F. normally encountered on the open mill. The peak modulus at 5 minutes in the hot Banbury results, probably, from the scorch phenomenon referred to earlier. A power record taken from a typical Banbury run (Figure 10) shows a power surge at 3 to 6 minutes following an initial dip in the curve due to thermoplastic effects. Stock taken after

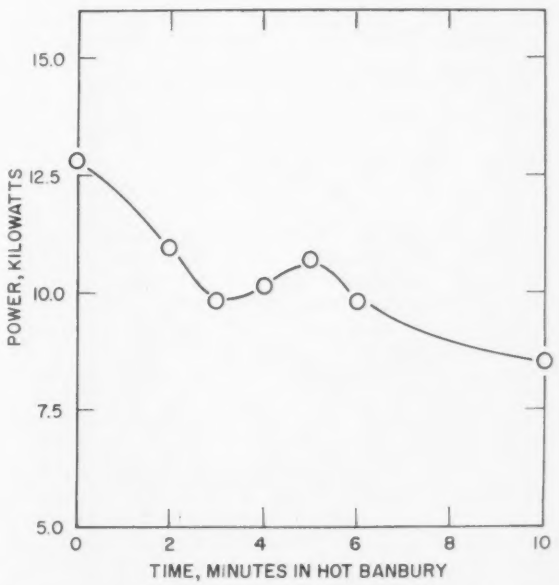

FIG. 10—Typical power curve for Banbury heat treatment of Butyl-Hi-Sil compound.

TABLE VIII — TENSILE PROPERTIES OF HI-SIL-GR-S COMPOUNDS BEFORE AND AFTER HEAT TREATMENT

	Conventionally Mixed				
Parts of Dibenzo G.M.F.	—	0.2	0.5	1.0	1.5
Modulus at 100%	260	275	300	310	325
(Lbs./In.²) 200%	455	470	545	545	555
300%	765	810	890	900	910
400%	1350	1400	1595	1565	1530
Tensile Strength, Lbs./In.²	2660	2630	2720	2570	2450
% Elongation	490	495	475	480	480
Shore Hardness	80	80	80	81	82
	Heat Treated				
Parts of Dibenzo G.M.F.	—	0.2	0.5	1.0	1.5
Modulus at 100%	300	375	430	430	500
(Lbs./In.²) 200%	800	950	1090	1125	1215
300%	1675	1725	2025	2160	2250
400%	2760	2800	3320	3430	
Tensile Strength, Lbs./In.²	3480	4100	4000	3875	3600
% Elongation	465	500	455	430	400
Shore Hardness	70	—	67	66	66
Δ300% Modulus, Lbs./In.²	910	915	1135	1260	1340
ΔTensile Strength, Lbs./In.²	820	1470	1280	1305	1150

only 5 minutes of heat treatment is rough, dry, and elastic, and unsuitable for further processing. After 10 minutes in the hot Banbury, the stock becomes smooth and can be easily processed in either calender or extrusion operations. Little is gained by extending the runs beyond 20 minutes and, in fact, it appears that the best results are obtained in from 10 to 15 minutes.

In the Banbury runs just described, masterbatch was mixed in a 6-minute schedule with full cooling water supplied to the rotors. Ten similar batches were prepared, an additional 1.0 part (per 100 of polymer) of Dibenzo G.M.F. being added in each of the last five batches. The Banbury was preheated before the heat treatment runs by churning an extra silica batch continuously for 30 minutes without cooling water. In the heat treatment runs, the temperature of the masterbatch rose rapidly, to 350°F. in 3 minutes and to 400°F. in 5 minutes. The temperature during the remainder of each run was maintained between 410 and 430°F. It was checked at 3- to 5-minute intervals by stopping the Banbury and thrusting a calibrated needle pyrometer into the rubber mass in the mixing chamber.

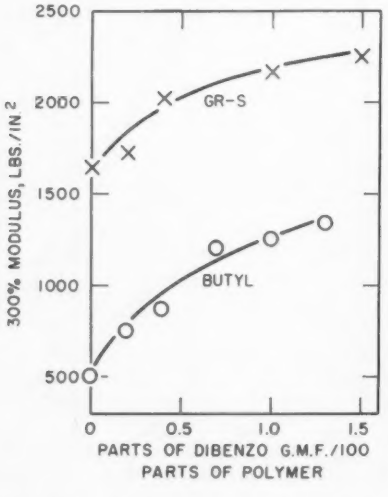

FIG. 11—Comparison of modulus changes resulting from heat treatment of Butyl and GR-S with Hi-Sil.

It is not necessary in Banbury heat treatment runs to use a two-cycle process as has just been described. Subsequent work *(15)* has shown that an adequate thermal interaction can be obtained in a single cycle operation, using from 8 to 12 minutes total time for both mixing and heat treating the masterbatch. These are shorter times than it was possible to use with carbon blacks and, for this reason, there is an economic advantage associated with the use of Hi-Sil.

Silica in GR-S

Hi-Sil was compounded with GR-S according to the following formulation:

MASTERBATCH

GR-S, L.T.P.	100.00
Hi-Sil 202	50.00
Stearic Acid	2.00
Glycerol	3.00
Phenyl-beta-naphthylamine	1.00
Dibenzo G.M.F.	As Indicated

VULCANIZING AGENTS

Zinc Oxide	5.00
Sulfur	3.00
Dibutyl Phthalate	3.00
Di-ortho-toluyl-guanidine	1.50
2, 2' Benzothiazyl disulfide	0.75

Heat treatment, as in the case of Butyl, consisted of milling the masterbatch for 20 minutes at 300 to 310°F. Vulcanizates were cured for 45 minutes at 287°F.

Data in Table VIII define the tensile properties of GR-S-Hi-Sil compounds prepared with and without heat treatment using varying amounts of Dibenzo G.M.F. Unlike the case with Butyl, a very significant response is obtained from unpromoted heat treatment. Modulus,

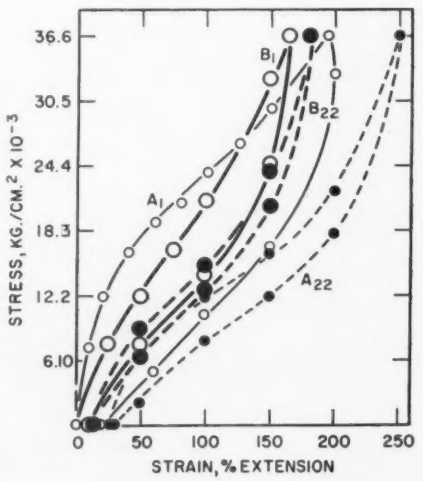

FIG. 12 — Cyclic extension-retraction curves for GR-S-Hi-Sil compounds before and after heat treatment. (The light and heavy lines refer to systems before and after heat treatment, respectively. The solid and dashed lines refer to the 1st and 22nd cycles, respectively.)

except at low extensions, is increased more than 100 per cent and tensile strength is increased 30 per cent. The use of promoting agent leads to further increases in both modulus and tensile strength. These latter changes, though they appear smaller on a percentage basis, are of the same order of magnitude as those reported for Butyl. This is illustrated graphically by the parallelism of the curves in Figure 11.

The flexibility and softness of GR-S-Hi-Sil compounds are greatly enhanced by heat treatment. This is evident from the shore hardness data given in Table VIII. It is further defined by the cyclic stress-strain curves in Figure 12. This figure, like the corresponding figure for Butyl, shows the decreased hysteresis and permanent set resulting from the heat treatment of a Hi-Sil-GR-S system. The 1st and 22nd extension-retraction cycles are portrayed for the compound before and after heat treatment with 0.5 part of Dibenzo G.M.F.

The thermal interaction of Hi-Sil-GR-S systems in the Banbury has been attempted. Heat build-up, as in the case of Butyl, is rapid with the temperature going above 350°F. in the first few minutes. Under the conditions, GR-S is quickly oxidized and in only 5 to 7 minutes the masterbatch burns. This spontaneous burning, initiated with charring and smoking, and finally glowing as the batch is dumped from the Banbury, is presumably the result of oxygen liberated during the dehydration of the silica *(13)*. Promoting agent is not required to produce burning nor does the use of an antioxidant such as phenyl-beta-naphthylamine appreciably reduce the tendency.

In the previous work with carbon blacks, it was found that GR-S masterbatches would burn when heat treated with channel black. A much longer time was required to initiate this burning with channel black, 30 to 40 minutes in the temperature range above 350°F. No similar burning was ever encountered, even in extended heat treatment runs, with furnace or thermal blacks. Thus, the oxygen on the surface of the pigment appears to influence the rate at which polymer is oxidized during the thermal interaction process. The thermal interaction of GR-S-Hi-Sil systems in the Banbury must be modified, by a masterbatch volume reduction or by the addition of plasticizer, to maintain temperature close to 300°F.

ACKNOWLEDGMENT

The authors acknowledge the assistance of Mr. J. C. Scarpa in carrying out the experimental work.

SPECIAL NOTE

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Special Boxes Simplify Handling of Hydraulic Brake Hose

DRAINING the alcohol from freshly cut hydraulic brake hose created handling difficulties for the Goodyear Tire and Rubber Company, which were solved by the use of aluminum boxes supplied by the Mutto Manufacturing Company of Canton, Ohio. The company made specially constructed boxes for Goodyear, perforated at the sides to permit easy drying and cooling of the hose, which becomes hot and dripping with alcohol during the cutting operation. The boxes are also equipped with handles, attached at either end, which allow about 75 percent nesting, yet can be pulled over the top of the boxes to permit stacking without damage to the hose.

These perforated aluminum boxes allow hot alcohol to drain easily from freshly cut hydraulic brake hose and permit the hose to cool and dry.

In addition to storing the hydraulic brake hose until the alcohol has drained, Goodyear uses the aluminum boxes for checking quantity of production. Since the aluminum absorbs none of the alcohol and is of constant weight, it is now possible to determine the number of pieces of hose produced simply by weighing the loaded containers, subtracting the standard weight of the boxes, and dividing by the known weight of a piece of hose. Previously, Goodyear drained the hose in cardboard containers, which deteriorated rapidly because of saturation with alcohol, and which, because of changing weight, could not be used to determine the quantity of production.

The new Mutto aluminum boxes have also proved to be handy containers for transporting the hose to the next area of production, Goodyear spokesmen state, because they are light, easy to handle, and eliminate the stacking problem which was evident before.

Petroleum Waxes for Protecting Rubber Compounds from Cracking

The Relative Merits of Ozone-Exposure Testing and Natural Aging of Rubber

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The effect of ozone on rubber is well known and is thoroughly covered in the literature. Protective surface coatings are generally utilized to minimize the effects of ozone and prolong the useful life of rubber articles. At present, hydrocarbon waxes, if added to rubber in excess of their solubility, are among the more economical and effective materials for the purpose.

Attempts have been made to use accelerated ozone-cracking tests in the laboratory as a guide to service performance of rubber. These accelerated methods, although useful, give questionable results in testing of rubber in which waxes are used.

This study was made to show some erroneous conclusions which may be drawn from an accelerated ozone test as compared with an outdoor exposure test when waxes are used as protective agents for rubber.

Data on ozone exposure are provided which do not correlate with those from a natural aging test. Several waxes which rated well in the accelerated test fared poorly outdoors.

WE all recognize the fact that rubber in service is subject to deterioration due to weathering. An understanding of the changes which occur, the causes and effects, have been recorded by many investigators *(2, 4, 6, 17, 18)*. Such changes are associated with ozone, oxygen, heat, light and water. Newton *(11)* demonstrated that ozone was the major cause of "exposure" cracking.

The susceptibility of rubber to attack by ozone is a consequence of its unsaturation, the ozone adding on at the double bond to form ozonides, which decompose with chain scission. Consequently, different elastomers vary greatly in their basic resistance to ozone attack. Neoprene is not as susceptible to ozone attack as Hevea or the copolymer rubbers *(3, 13)*. Hypalon, DuPont's chlorosulfonated polyethylene, is considered a material fairly resistant in this respect. Harrison *(9)* has shown GR-S to be more susceptible to ozone than natural rubber.

A surface coating of a material which will protect the underlying rubber surface from attack by ozone has been the most satisfactory means of prolonging the useful life of rubber articles. Williams *(18)* suggested oxidized rubber as a means of protection. The use of cellulose for reducing cracking in rubber articles was cited by Haushalter *(8)*. Newton *(12)* suggested bituminous paint for preventing ozone from reaching the rubber surface. Protective coatings have been utilized by Rock Island Arsenal for imparting ozone resistance to various polymers *(14)*.

Since dynamic flexing of rubber will eventually destroy a protective layer, it is desirable to have such materials in the rubber which will constantly exude to the surface to protect it. At present, hydrocarbon waxes if added to compounds in excess of their solubility are among the more economical and effective materials for the purpose, as shown by Crabtree and Kemp *(5)*, Best and Moakes *(1)*, Winkelmann *(19)*, Morris and Werkenthin *(10)*, and Garvey and Emmett *(7)*.

Since cracking of rubber is primarily due to ozone, many investigators have attempted to use ozone-cracking tests in the laboratory as a guide to outdoor service performance. A standard method of preparing and handling samples has been developed by the SAE-ASTM Technical Committee on Automotive Rubber. However, no standard laboratory test has been devised or developed which will correlate outdoor exposure. It is practically impossible to duplicate weathering factors, especially the effects of light.

The accelerated tests which have been devised are based on the determination of the resistance of a rubber product to the most important influence to which it is exposed in service, namely, ozone. These accelerated methods, although useful, give rather variable results in the examination of rubber in which waxes are used, due to the variable nature of outdoor exposure conditions. Ozone tests do not take into consideration the effects of sunlight, temperature changes, and water. Conclusions are drawn and compounds selected from such tests which do not perform well on outdoor exposure. The observations made from such accelerated ozone tests must be carefully interpreted if they are to be used for estimat-

TABLE I—BASE COMPOUND

(Press Cured in 45 Minutes at 307°F.)

GR-S	100.00
Mercaptobenzothiazole	1.50
Diphenylguanidine	0.15
SRF Black	40.00
Zinc Oxide	5.00
Sulfur	2.00
Sun-checking Wax	3.00*

* Except as shown in Tables II to IV for Compounds No. 38 and No. 39.

Note: This paper was presented at the 67th Meeting of the Division of Rubber Chemistry, American Chemical Society, Detroit, Mich., May 4-6, 1955.

ing the outdoor service life under normal atmospheric conditions.

This study was made to show some erroneous conclusions which may be drawn from an accelerated ozone test as compared with an outdoor exposure test. The subject of the many variables involved in compounding and testing has been thoroughly covered by other investigators *(4, 19)*. We have limited our study only to the use of waxes, more frequently called sun-checking agents, for the protection of rubber.

Test Chamber for Accelerated Ozone Testing

A special unit was constructed for this investigation using certain modifications of the Crabtree-Kemp *(5)* apparatus and the procedure of ASTM D-1149-51-T and D-470-52-T. This apparatus maintained standard conditions of exposure. The unit is shown in Figure 1.

The chamber is constructed of plywood, except for a heavy glass front framed for viewing the specimens. The inside of the cabinet and all exposed metal parts are thoroughly painted with several coats of lacquer and heavily coated with paraffin wax. The viewing door employs a gasket of polyethylene to ensure an air-tight seal. The chamber has a capacity of 4500 cubic inches. Ozone is supplied to the chamber by a current of air thoroughly dried over desiccants and controlled with a Brook's flowmeter at the rate of 15 cubic feet per hour. A surge tank (not shown in the illustration) is employed to eliminate fluctuations of air flow.

The ozone generator consists of two aluminum mesh screens separated by a sheet of mica and is contained in a specially blown glass receptacle with outlets. A powerstat controls the voltage from a transformer to energize the generator. Uniform distribution of ozone is ensured in the chamber by means of a baffle surrounding the ozonizer and an electric fan with 4-inch blades. A thermo-regulated switch coupled to a 300-watt heater maintains an ambient temperature of 75 ± 5°F. The temperature can be varied and controlled to 120 ± 5°F.

The ozone concentration is carefully controlled and determined by means of auxiliary equipment suggested by Crabtree and Kemp *(5)*. Readings were taken of ozone concentration versus voltage and a plot made on semi-log paper. A straight-line function was obtained.

FIG. 1—Ozone chamber used for testing.

TABLE II—PROPERTIES OF WAXES USED FOR EVALUATION

Compound Number	Wax Sample	Properties ASTM Drop MP, °F	Properties Vis. SUS @ 210°F
11	Control (No Wax)	—	—
12	Wax No. 1	166.8	51
13	Wax No. 2	153.2	46
14	Wax No. 3	154.0	43
15	Wax No. 4	165.8	53.8
16	Wax No. 5	171.0	52
17	Special Wax Blend	150.0	53
18	Blend of high melt microcrystalline wax and paraffin wax	154.0	52
19	Special Wax Blend + .0025% Sustane	150.0	53
20	Three-component blend of an intermediate wax, a microcrystalline wax and paraffin wax	153.0	50
21	150 AMP Fully Refined Wax	151.0	42
22	Wax No. 6	152.6	51
32	Wax No. 7	160.0	50
33	Wax No. 8	147.0	45
34	Wax No. 9	150.5	43
35	Special Wax Blend + 5% Polyethylene	175.0	224
36	Special Wax Blend + 10% Polyethylene	188.0	366
37	Wax No. 10	159.0	45
38	Special Wax Blend, 4 PHR	150.0	53
39	Special Wax Blend, 5 PHR	150.0	53

From this curve, voltmeter and powerstat settings could be made which would give an ozone concentration very close to the desired amount. Daily determinations were made of ozone concentration, however, to be certain the conditions were constant.

Our first tests were performed with the ozone concentration at 25 parts per hundred million of air. Many of the waxes in the specimens evaluated offered good resistance at this concentration. It was difficult to determine differences among the more ozone-resistant samples. The extent of deterioration was slow, with the exception of the control without wax, and constant examination of samples was necessary to determine first signs of cracking. Examination of such samples could only be made by close scrutiny under magnification. This required removal of the racks from the ozone cabinet which then required readjustment of conditions.

Since we were primarily concerned with relative results, the voltage was increased to give an ozone concentration of 1 to 3 parts per million of air. One hour at this concentration was sufficient to establish significant differences with the various samples. First signs of cracking and the extent of damage could be viewed readily through the glass door. Increasing the concentration above that naturally occurring in the atmosphere gives good acceleration without appearing to change the essential nature of the action.

Experimental Method

Because this investigation did not include a detailed study of recognized variables other than wax, testing was restricted to established procedures. The compound used, a modified tire tread recipe, is shown in Table I. All compounds were mixed on a 12-inch mill. The ingredients were mixed in a base masterbatch and wax added to the individual compound.

The waxes used and their properties are shown in Table II. The numbered waxes are proprietary materials marketed as sun-checking agents by various sup-

pliers. Compound 17 uses Socony Mobil's flaked sun-checking wax which is a special blend of a microcrystalline and a paraffin wax. Compound 18 is a blend of a high-melting microcrystalline wax and a 143 AMP paraffin wax, and was included in this study to determine its effectiveness as compared with the previous blend. A three-component wax blend was used in Compound 19 to determine the value of an intermediate wax as a component for improving resistance of rubber exposed to atmospheric conditions. A 150 AMP Fully Refined Wax used in Compound 21 is Socony Mobil's high melt, straight paraffin wax. It is comparable to other similar proprietary, straight paraffin waxes offered to the industry for rubber protection.

Several of the compounds (19, 35, and 36) employed additives with the special wax blend used in Compound 17 to determine their value for improving a wax for rubber. Sustane, tertiary butyl hydroxy anisole, is an oxidation inhibitor for wax. Polyethylene is a thermoplastic resin which has a wax-like appearance and is used to modify wax properties.

Antioxidants as such were omitted from the base compound to avoid erroneous interpretations of the effectiveness of the wax used. Softeners were also eliminated from the base compound, since other investigators *(1, 4, 16)* have shown they detract from the ozone resistance of a wax-protected rubber compound, especially those using paraffin waxes.

After compounding, the uncured sheets were stored for 24 hours at 70°F. before curing. All compounds were press-cured for 45 minutes at 307°F. At this temperature, the straight paraffin waxes bloomed most rapidly and produced the heaviest coating; blended waxes were slower to bloom.

Sheets were cured between cellophane to avoid transfer of wax from one sheet to another through mold contamination. All sheets were separated from each other by paper and stored in the dark 48 hours until mounted for testing in the cabinet or outdoors.

Samples were prepared and fastened to lacquered boards by staples, according to ASTM D-518-44, Method A. Three sets of samples were tested by exposure for one hour in the ozone chamber. These included specimens which were placed in the ozone chamber immediately after 20% elongation; those which were held for 48 hours at 20% elongation in ordinary atmosphere prior to exposure in ozone, and samples which had been maintained at 20% strain at 120°F. for 24 hours prior to exposure.

Immediately after exposure to ozone for the test period, the specimens were rated. Arbitrary ratings from "excellent" to "very poor" were assigned numerical values based on the number of cracks and extent of deterioration. For example, the control samples without wax have no severe cracks; however, the entire surface is covered with fine cracks and no area is free from

TABLE III—COMPARATIVE OZONE EXPOSURE TESTS

(1 Hour at 75 to 80°F.)

Compound Number	Wax Sample	Ozone Exposure Rating Samples Tested: Immediately After Mounting	48 Hours After Mounting	After 24 Hrs. @ 120°F
11	Control (No Wax)	7	7	7
12	Wax No. 1	4	3	2
13	Wax No. 2	4	4	3
14	Wax No. 3	7	7	6
15	Wax No. 4	6	5	5
16	Wax No. 5	4	3	2
17	Special Wax Blend	5	4	2
18	Blend of high melt microcrystalline wax and paraffin wax	5	5	3
19	Special Wax Blend + 0.0025% Sustane	4	4	2
20	Three-component blend of an intermediate wax, a microcrystalline wax and paraffin wax	6	6	6
21	150 AMP Fully Refined Wax	6	7	7
22	Wax No. 6	5	6	3
32	Wax No. 7	7	5	2
33	Wax No. 8	6	4	2
34	Wax No. 9	3	3	1
35	Special Wax Blend + 5% Polyethylene	6	5	1
36	Special Wax Blend + 10% Polyethylene	5	5	6
37	Wax No. 10	7	7	6
38	Special Wax Blend, 4 PHR	4	4	1
39	Special Wax Blend, 5 PHR	4	3	2

EXPOSURE RATING

1—Excellent; 2—Good; 3—Medium to Good; 4—Medium; 5—Medium to Poor; 6—Poor; 7—Very Poor.

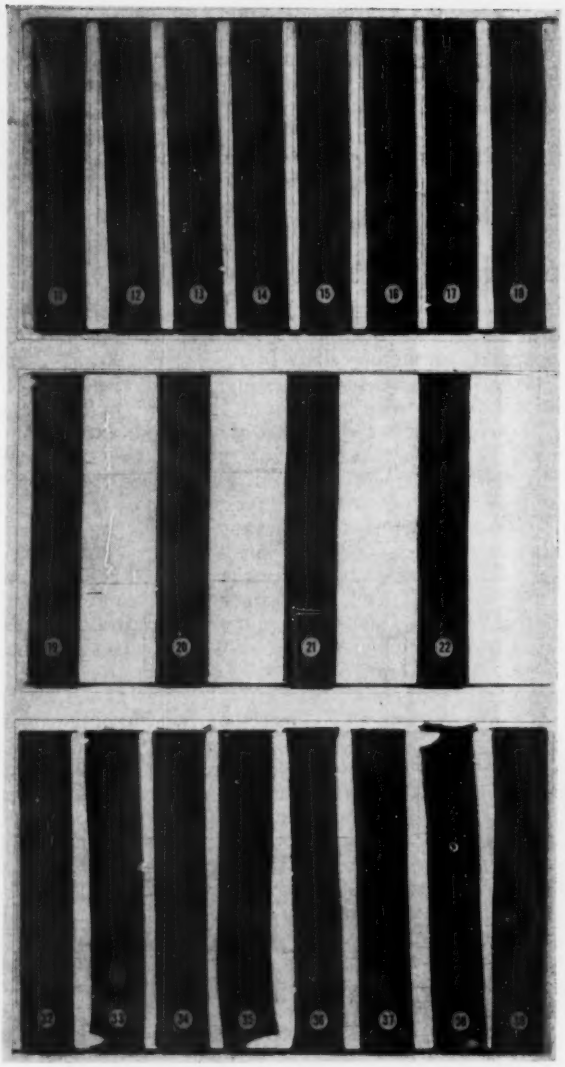

FIG. 2—Samples tested immediately after mounting.

impairment. Such samples were given a rating of 7 or "very poor".

The rating of the specimens depended on the personal judgment of one observer. This is subject to criticism. However, the independent and periodic random observation by other personnel determined the validity and consistency of this evaluation. The error was very slight, since the type of cracking and the number of cracks could be visually counted and compared.

A concentration of strain imposed on the elongated specimens occurs at the top and bottom where they are severely stretched and mounted on the boards. Breaks occur prematurely at these points during testing. Any sharp edges on the boards affect the extent of damage to the samples. Consequently, the cracks and ruptures, which appear on the top and bottom and will be noted in the illustrations, were disregarded in the ratings. The results are shown in Table III and illustrated in Figures 2, 3 and 4 for the various stages.

For natural aging, specimens were looped and mounted on lacquered boards according to ASTM D-518-44, Method B. In this condition, they were allowed to develop a wax bloom on the stretched surface for 48 hours in the dark before exposure. They were then exposed outdoors under static conditions for one year. Previous experience has shown that looped specimens are preferred to stretched samples over long test periods. Stretched samples are more subject to relaxation and creep as damage progresses. After exposure for several months at constant strain, stretched samples show considerable stress decay, thereby tending to inhibit further atmospheric cracking. This relaxation of strain leads to questionable interpretations.

Observations were made periodically for appearance and evidence of damage, either crazing, cracking or rupture. These results are reported in Table IV. Figure 5 illustrates the extent of damage at the termination of the test—one year.

DISCUSSION OF RESULTS

The value of an accelerated test can best be judged by the degree of correlation that test has with one under actual service conditions. The latter may vary from one extreme to another in respect to atmospheric conditions, dynamic and static stresses, relaxation, and sequence of

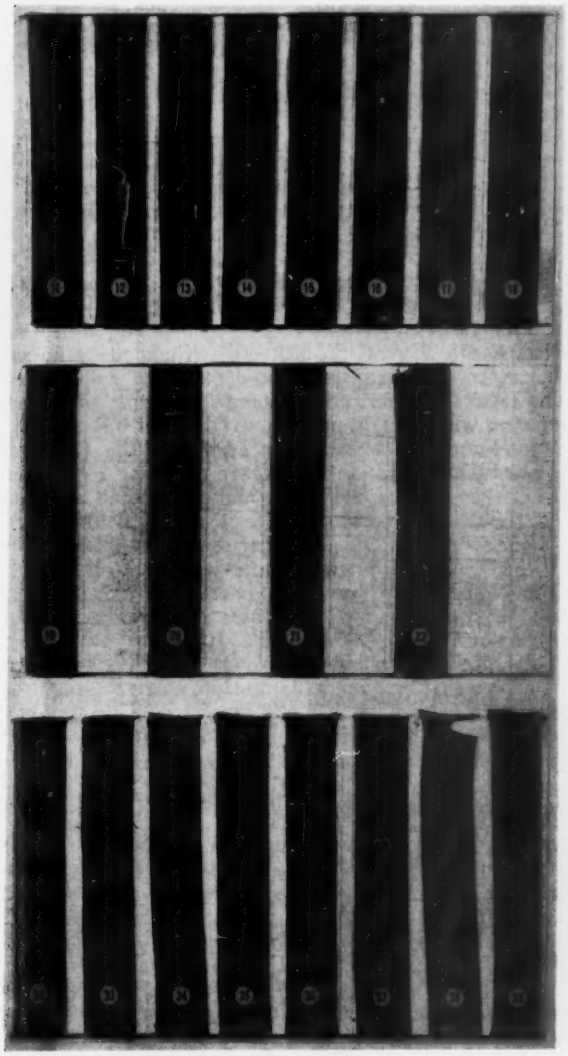

FIG. 3—Samples tested 48 hours after mounting.

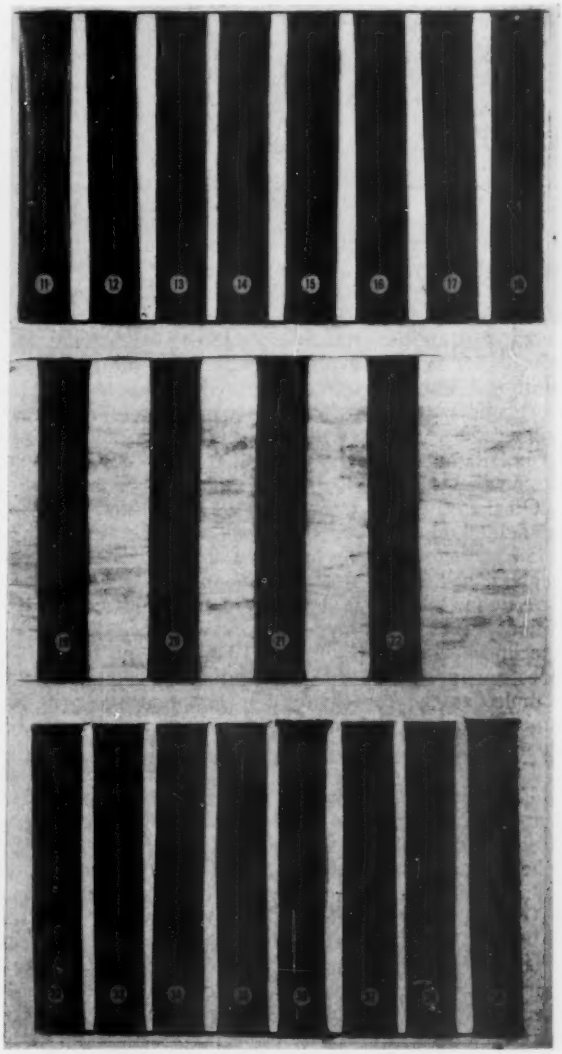

FIG. 4—Samples tested after accelerated blooming (24 hours at 120°F.)

TABLE IV—COMPARATIVE ROOF EXPOSURE TESTS

(Press Cured: 45 Minutes at 307°F.)

Compound Number	Wax Sample	Exposure Time (Months) 1	4	7	10	12
11	Control (No Wax)	2	4	7	7	7
12	Wax No. 1	1	1	2	5	7
13	Wax No. 2	1	1	2	4	6
14	Wax No. 3	1	1	1	1	1
15	Wax No. 4	1	2	2	4	5
16	Wax No. 5	1	2	4	6	6
17	Special Wax Blend	1	1	1	2	3
18	Blend of high melt micro-crystalline wax and paraffin wax	1	1	1	2	3
19	Special Wax Blend + 0.0025% Sustane	1	1	1	2	3
20	Three-component blend of an intermediate wax, a micro-crystalline wax and paraffin wax	1	1	2	3	4
21	150 AMP Fully Refined Wax	1	1	1	1	1
22	Wax No. 6	1	2	2	4	5
32	Wax No. 7	1	1	2	3	4
33	Wax No. 8	1	1	1	1	1
34	Wax No. 9	2	3	4	7	7
35	Special Wax Blend + 5% Polyethylene	1	1	2	3	4
36	Special Wax Blend + 10% Polyethylene	1	1	2	3	4
37	Wax No. 10	1	1	2	5	7
38	Special Wax Blend, 4 PHR	1	1	1	1	1
39	Special Wax Blend, 5 PHR	1	1	1	1	1

EXPOSURE RATING

1—Excellent; 2—Good; 3—Medium to Good; 4—Medium; 5—Medium to Poor; 6—Poor; 7—Very Poor.

changes. Consequently, when we speak of natural aging as a laboratory test, although we realize it does not accelerate all conditions, it still is another form of accelerated testing. Service conditions were simulated to the extent that rubber strips were exposed outdoors continuously for one year and thus through all seasons of weather. The test was accelerated in that the samples were under static stress and subject to the changes in temperature. In the light of these circumstances, it will be noted that our natural aging test conditions did not duplicate actual service which imposes dynamic flexing.

On the other hand, the so-called accelerated tests were conducted on elongated specimens of rubber exposed for one hour to an atmosphere containing ozone at a concentration far in excess of the natural concentration. The net result at the end of the test, under these conditions, was approximately as severe as in the case of specimens aged outdoors for 10 months or more. This does not infer that ozone was equally deleterious on all samples as the combination of temperature, light, and moisture in varying degrees throughout the year, outdoors.

Furthermore, exposure to ozone for one hour at 75 ± 5°F. does not allow much time for the wax in the rubber compound to bloom to the surface where it will have the opportunity to perform its function most effectively. The various phases of this study were set up to establish this effect. Holding the specimens for 24 hours at 120°F. before exposure to ozone was partially effective, in most cases. What was lacking was the continual blooming and reabsorption with temperature change during exposure. For these reasons, we shall first discuss the results of outdoor aging as being more nearly representative of what may be expected under actual service conditions, with the exceptions noted earlier. Then, we shall point to the fallacy of relying too greatly on data from accelerated exposure tests.

Outdoor Aging

Reference to Table IV shows that only 3 specimens were without some deterioration after one year exposure outdoors of the 17 compounds containing wax in the amount of 3 PHR. These were Compounds 14, 21 and 33.

The wax used for the sample in Compound 14 is a straight paraffin wax having an ASTM melting point of 154°F. and a viscosity of 43 Saybolt seconds at 210°F. The specimens of Compound 21 use Socony Mobil's 150 AMP Fully Refined Wax which has an ASTM melting point of 151°F. and a Saybolt Viscosity of 42 seconds at 210°F. Paraffin wax is an interesting example of a material that provides some protection in sunlight but which allows bad deterioration in ozone, as we shall note later. The results we obtained with these straight paraffin waxes in our study concur with those previously noted by Somerville, Ball and Cope *(3)* and Best and Moakes *(1)*.

The good performance of these paraffin waxes may be attributed to the fact that there was no dynamic flexing of the rubber specimens. Paraffin waxes are of large crystal size and bloom rapidly to the rubber surface. When such wax blooms, the crystals are not packed tightly together, adhere poorly to the rubber surface and exhibit poor extensibility. Consequently, rubber compounds which utilize paraffin waxes *per se* are poorly protected, due to the tendency of the wax to flake off, especially when flexed.

Compound 33 uses a wax having an ASTM melting point of 147°F. and a viscosity of 45 Saybolt seconds at 210°F. These data indicate that this product is a blended wax, consisting mainly of paraffinic constituents.

The samples using the special wax blend used in Compound 17 show one small edge crack after 12 months' exposure. No advantage was gained by the use of the inhibitor, Sustane, with this wax, as noted in Compound 19. Increasing the amount of the special blend to 4 PHR and 5 PHR, as in Compounds 38 and 39, respectively, improves its performance with rubber. The results obtained are comparable to those previously reported with straight paraffin waxes, Compounds 14 and 21, and with the blend used in Compound 33. However, blended waxes have the advantage of better adhesion to the rubber surface due to the microcrystalline wax content. Such waxes will not flake off during flexing of the rubber specimens and will offer more protection. Seven of the 8 other proprietary waxes evaluated give ratings from "medium to poor" to "poor" and only the wax used in Compound 32 was able to impart "medium" protection.

The use of polyethylene with the special blended wax, as shown in Compounds 35 and 36, caused a slight acceleration of damage in 7 to 10 months. This may have been the result of raising the viscosity of the wax to a point where its blooming rate may have been retarded.

Accelerated Ozone Testing

Three procedures were studied in connection with exposure to ozone, as shown in Table III. One group of samples was exposed immediately after elongation, the second group was exposed after a period of 48 hours elapsed from the time of strain, and the third group was held under strain at 120°F. for 24 hours before exposure.

It is recognized that when rubber specimens containing wax are stretched, the protective surface film is damaged and the rubber is subject to attack by ozone. If such samples are rested prior to exposure in ozone, the protective wax film will reform, the rate and type of film

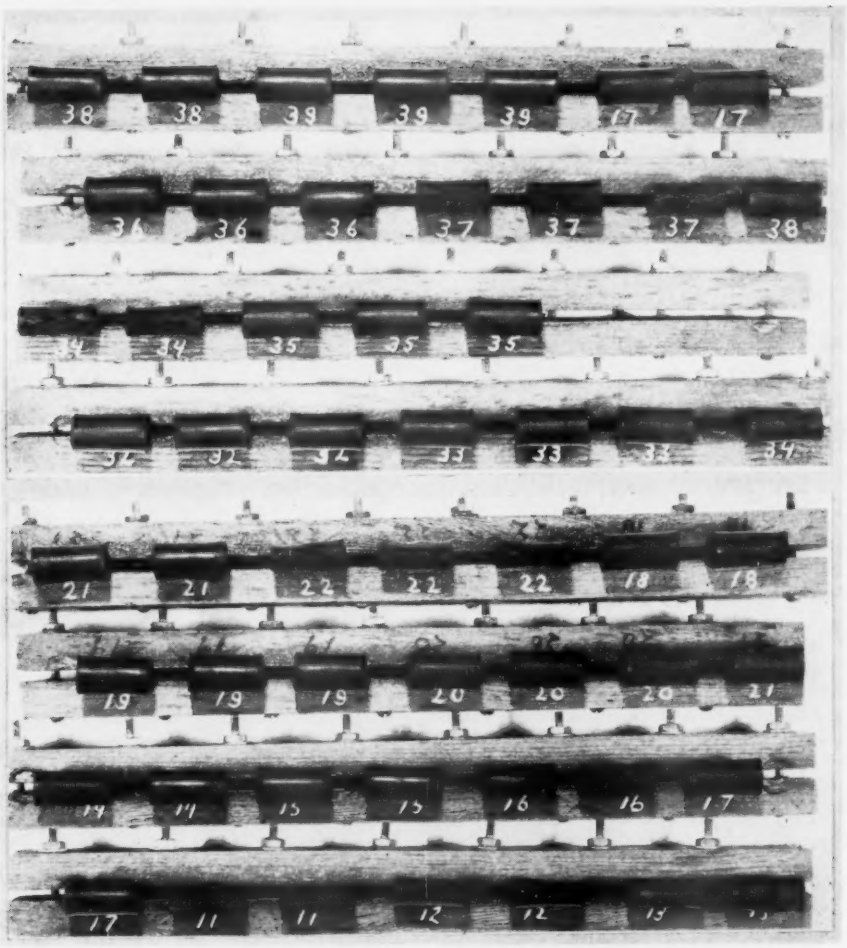

FIG. 5—Outdoor aging—12 months.

reforming being dependent upon the properties of the wax and conditions of storage. Certain waxes will bloom more rapidly than others. Likewise, temperature has a profound effect on the bleeding rate of a wax from rubber due to its effect on the solubility of the wax in rubber and the rate of diffusion. The three conditioning periods prior to exposure used in this study were designed to take into account these various factors.

It will be noted that deterioration, in general, was most severe with the first group and became progressively less with the second and third groups. Only three samples deviated from this trend. It appears, therefore, that the slight improvement shown in the second group, rested 48 hours prior to exposure, by 8 of the 19 specimens containing wax, could be ascribed to blooming of the wax. This phenomenon had little time to become especially evident in the first group. In the third group, 15 specimens showed improvement over the corresponding value in the second group. Raising the temperature to 120°F. and holding it for 24 hours before exposure to ozone afforded still more opportunity for wax to bloom to the surface.

Crabtree and Kemp *(4)* indicated that protection of a wax disappeared as a result of reabsorption of the wax into the rubber mass at temperatures of 100 to 120°F. Our results did not confirm this for the waxes, both blended and straight paraffin, studied in this investigation. A good protective coating was evident on all samples after subjecting to 120°F. for 24 hours. This tendency of certain waxes to bloom more rapidly than others indicates the cause of variable results between different laboratories with ozone testing. Sufficient time must be allowed for certain waxes to bloom before testing in order to avoid questionable results.

The order of rating the samples is approximately the same for the three procedures, the third group showing the widest spread in ratings. We felt that conditions used for this latter group allowed sufficient time for the wax present to bloom. Since we further felt that the rubber samples were uniformly protected and allowed for any variables of rate of bloom, most of our discussion should be confined to this group. Any significant difference could be attributed to the wax alone.

Under these conditions, only one proprietary blended product, Compound 34, used in a concentration of 3 PHR, gave "excellent" protection. The blended wax with 5% polyethylene used in Compound 35 or increasing one of the blended waxes to 4 PHR as in Compound 38 also gave "excellent" protection.

The blended waxes used in Compounds 12, 16, 17, 32 and 33 gave "good" protection. Compounds 14 and 21 using straight high melt paraffin wax and Compound 37 using a proprietary blended wax gave either "poor" or "very poor" protection and were only slightly better than the control sample without wax.

The use of the inhibitor, Sustane, with the blended wax shown in Compound 19 afforded no greater protec-

tion than the wax alone. Whereas the use of polyethylene in the amount of 5% with the blended wax used in Compound 35 gave "excellent" protection, the use of 10% polyethylene with the wax in Compound 36 changed the rating from "excellent" to "poor". Evidently, the viscosity of the wax was raised too much to permit sufficient blooming. On the other hand, since 5% polyethylene improved the wax, a change in crystal formation may have been the cause.

The other blends of waxes used in Compounds 18 and 20 were not as effective as the blend used in Compound 17, indicating the optimum blend of component waxes was used for the latter.

Comparison of Outdoor and Accelerated Aging

Table V lists the ratings from both types of exposure, starting with the best values—1—and continuing in order to the lowest value—7—for the control without wax, based on outdoor aging. Both outdoor and ozone ratings are listed for comparison.

It will be noted that the two straight high-melt paraffin waxes used in Compounds 14 and 21 were rated "excellent" on outdoor aging, but "poor" and "very poor", respectively, on accelerated aging. This failure of paraffin wax under accelerated ozone testing has already been reported and noticed by several authors, including Van Rossem and Talen *(17)*. The performance of paraffin wax in rubber is one of the anomalies which must be anticipated in attempting to correlate natural and accelerated aging of rubber. Conversely, Compound 34, which used a proprietary blended wax, was "very poor" outdoors and "excellent" after ozone exposure. Similarly, Compounds 12 and 16, both blended waxes, were "medium to poor" and "poor", respectively, outdoors, and both "good" after ozone exposure.

While 12 of the 20 specimens, including the control, have outdoor ratings within one unit of their respective accelerated test rating, the extent of cracking of the ozone-tested samples was considerably greater than that of the outdoor specimens. We, therefore, consider the correlation between the two methods of exposure to be poor, by our results.

Assuming, however, that there is some justification for the use of an ozone-exposure test by the rubber industry and, at the same time, that a wax must pass a test having some semblance of actual service conditions, only two blended waxes, as used in Compounds 17 and 33, can be considered satisfactory from these results. In the normal proportion of 3 PHR, Compound 17 rated "good" under both methods of testing. Using 4 PHR of this wax, the rating was "excellent" in both cases. The wax used in Compound 33 gave "excellent" performance outdoors and "good" protection on exposure to ozone.

The economics of the preferred wax should be a factor in its consideration, particularly when a larger concentration can be employed on the same or a lower cost basis. The more wax in a compound, especially of a slow-blooming wax, the greater should be the protection for a longer period of time.

Conclusions

The ozone exposure test used in this study provides data which do not correlate with data from a natural aging test. Several waxes which rated well in the accelerated test fared poorly under atmospheric conditions.

Our results indicate a direct relation between the protection afforded rubber by waxes tested in ozone and the period of rest prior to aging.

This variable should be more clearly defined by standardization which would cover the rapid blooming of paraffin waxes and the slower blooming of specially blended waxes. This might ensure more uniformity between different laboratories with accelerated aging.

TABLE V—COMPARISON OF RATINGS: OUTDOOR VS. ACCELERATED AGING

Compound Number	Wax Sample	Outdoor Aging (12 Mos.)	Accelerated Aging
38	Special Wax Blend, 4 PHR	1	1
39	Special Wax Blend, 5 PHR	1	2
33	Wax No. 8	1	2
14	Wax No. 3	1	6
21	150 AMP Fully Refined Wax	1	7
17	Special Wax Blend, 3 PHR	3	2
19	Special Wax Blend + 0.0025% Sustane	3	2
18	Blend of high melt microcrystalline wax and paraffin wax	3	3
35	Special Wax Blend + 5% Polyethylene	4	1
36	Special Wax Blend + 10% Polyethylene	4	6
18	Three-Component Blend of an Intermediate Wax, a microcrystalline wax and a paraffin wax	4	6
32	Wax No. 7	4	2
22	Wax No. 6	5	3
15	Wax No. 4	5	5
13	Wax No. 2	6	3
16	Wax No. 5	6	2
12	Wax No. 1	7	2
37	Wax No. 10	7	6
34	Wax No. 9	7	1
11	Control (No. Wax)	7	7

EXPOSURE RATING

1—Excellent; 2—Good; 3—Medium to Good; 4—Medium; 5—Medium to Poor; 6—Poor; 7—Very Poor.

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Editorials . . .

Code of Ethics

THERE is no doubt at this point that consumption of new rubber, both in the United States and worldwide, will establish a new all-time peak record this year. The United States alone will account for almost 1,500,000 long tons, of which approximately 840,000 tons will be synthetic rubber. This figure includes GR-S types, neoprene, Butyl and the nitrile rubbers. Obviously the operators of the formerly government-owned synthetic rubber plants have no sales problems at the moment and production at almost every plant is proceeding at near capacity.

This is the time to take a long look at the future when competitive conditions will be somewhat more intense than they are at present or are likely to be in the next twelve months. As B. M. G. Zwicker, director of new products planning for the B. F. Goodrich Chemical Co., pointed out in a recent talk before the Rubber Division of the Chemical Institute of Canada, there are some potentially serious problems that must be faced in the increasingly competitive years ahead, if the synthetic rubber manufacturers are to hold and increase their current position. Rubber consumers, too, are involved in these problems.

As Mr. Zwicker views the problems, they fall into three specific categories, as follows:

(1) Polymer manufacturers and fabricators may tend to offer inadequately tested or actually unnecessary new and different polymers and products just for appearance of competition and progress.

(2) Product manufacturers may fail to take advantage of really improved polymers through indifference, resentment, technical inability or too much dependence on the polymer manufacturers to do the whole job.

(3) Consumers may become reactionary or bearish and fail to keep up demand for improved materials.

It is obvious, or should be, that it will take a cooperative and realistic approach by both manufacturing industries to maintain sound progress towards the essential goal of better consumer value for less money, which is synonymous with the constant improvement in our standard of living. As Mr. Zwicker sees it, if the actual or potential existence of the problems outlined above is accepted, then the following precepts represent a possible approach to a rational, cooperative program between supplier and fabricator, with ample room for free enterprise and competition to contribute the most towards efficient and worthwhile service to the ultimate consumer:

(A) Both polymer and product manufacturer should accept research and development as a necessary cost of doing business and so provide each company with the means of sound technical communication and judgment. This premise will have to be sold to the ultimate consumer so that prices can reflect these honest costs.

(B) Competitive enterprises in both industries should exercise restraint and avoid premature, emotional or dishonest commercial promotion of products which could lead to loss of manufacturer or consumer confidence. Polymer manufacturers should be sure they have a really improved product and that they can make it reproducibly at an acceptable price before asking product manufacturers to spend the time to evaluate and develop applications for it. Product manufacturers should analyze long range needs for really improved polymers and thus help polymer manufacturers to aim in the right direction. Meanwhile, they should do their best to make products for existing needs with commercially established polymers rather than depend on some new material.

The Goodrich planning expert is well aware of the fact that it takes ideas, time, money and lots of hard work to develop proper commercial outlets for any new polymer. It also takes the same elements to develop it in the first place. Attempts to rush a logical development program lead to wasted effort, overtime costs, bad judgment, hurt feelings, and sometimes even damage suits. Probably the greatest damage done in the long run is to the prestige of the company and, directly and indirectly, to the industry as a whole. This is a situation of which the plastics industry is keenly aware, and expensive programs are now under way to rectify some of the mistakes made in the early growth of the field, particularly immediately following World War II.

In his concluding remarks, Mr. Zwicker emphasized the point that it is extremely important that the entire synthetic rubber industry cooperatively agree on a program that will be guided by planning and common sense, rather than haggling and state-of-emergency operations. Acceptance of such a code of ethics, even if the result were assured utopia, would require a tremendous and continuing effort to make it work. The end result would certainly justify the effort, and we recommend Mr. Zwicker's program for the consideration not only of the new manufacturers of synthetic rubber, but those with established records as well.

Highlights Sidelights *of the News . . .*

September, 1955

The Rubber Producing Facilities Disposal Commission has set October 7 as the deadline for receiving proposals to purchase the government-owned plant at Institute, West Va. . . . The President signed legislation authorizing sale of the facility on August 9 . . . Under the disposal law, the Disposal Commission will have seventy-five days after October 7 to negotiate with propective purchasers (page 893).

Good progress is being made in restoring to full operation those plants which were hit by the recent floods in the Northeastern section of the United States . . . Many plants reported the resumption of limited operations as soon as the flood waters had receded . . .Damages to the plants involved may run into the millions (page 896).

The National Science Foundation has announced the appointment of a special eleven-member commission to develop recommendations on the future role of the federal government in basic research on synthetic rubber . . . The new commission was set up upon the recommendation of the Disposal Commission and it is expected that its report will be submitted to Congress shortly after it reconvenes in January, 1956 (page 893).

The management of the Thermoid Co., Trenton, N. J., has won a resounding victory over an insurgent stockholder group which sought to unseat it . . . The decision came after two months of proxy campaigning by the opposing sides . . . Still pending is a stockholder suit against five former Thermoid officials asking that these officials be declared guilty of breach of trust and held accountable for expenses and penalties the company may suffer because of financial irregularities (page 897).

Port of New York rubber importers are said to be looking around for new unloading berths in order to centralize their rubber handling facilities and to obtain less expensive pier storage or demurrage rates . . . Alternate proposals would shift operations either to the Port of Newark or to Staten Island . . . Port of New York officials will fight to keep the rubber unloading operations from being shifted elsewhere (page 895).

The rubber industry mourned the passing of one of its pioneers, Frank Augustus Seiberling, who passed away on August 11 at the age of ninety-five . . .Founder of two major rubber companies, Mr. Seiberling played a vital role in the growth of the American rubber industry during the past fifty years (page 920).

NEWS REPORTS and Industry Activities

BIDDING FOR INSTITUTE FACILITY IN PROGRESS; GOVERNMENT RESEARCH ACTIVITIES UNDER STUDY

THE Rubber Producing Facilities Disposal Commission announced on August 11 that the sixty-day period for receiving proposals to purchase the government-owned synthetic rubber plant at Institute, West Va., would end at midnight on October 7, 1955. The President signed legislation authorizing extension of negotiations for sale of the Institute plant on August 9. Under its provisions (Public Law 336, 84th Congress, First Session), the sixty-day period began with the date of the President's approval.

On August 15, the National Science Foundation announced the appointment of a special eleven-member commission to develop recommendations on the future role of the federal government in basic research on synthetic rubber. The research commission, announced by Dr. Alan T. Waterman, director of the National Science Foundation, was set up at the suggestion of the Disposal Commission. The National Science Foundation assumed responsibility for the operation of the government's synthetic rubber research program on July 1, 1955.

In announcing the deadline for the acceptance of bids on the Institute facility, the Disposal Commission stated that descriptive brochures of the facility are available to qualified purchasers on application to the Commission at 811 Vermont Avenue N. W., Washington 25, D. C. Official advertisements inviting proposals have already appeared in a number of newspapers throughout the country.

Under Public Law 336, the Disposal Commission will negotiate for a period not to exceed seventy-five days on the proposals received. Within ten days after the Congress reconvenes next January, the Disposal Commission must report to Congress, which in turn has thirty days to review the recommendations. The law provides that the Attorney General must pass on the recommendations from the standpoint of the anti-trust laws.

Largest Copolymer Facility

The Institute plant is the largest of the government-built copolymer facilities, with an assigned annual capacity of 122,000 long tons of GR-S. No bids were received for the plant in original negotiations of the Commission. It has been in standby since September, 1953. Sale of the Institute plant would leave only the alcohol-butadiene plant at Louisville, Ky., still in government hands. This plant has been leased for three years to Publicker Industries, Inc. There were twenty-seven plants offered for disposal in the original program and 25 have been sold.

Government Research Study

The synthetic rubber research program, including the operation of a pilot plant and testing laboratory, was developed as an integral part of the synthetic rubber program during World War II. At the time when the first twenty-four synthetic rubber facilities were sold, the Disposal Commission made public its recommendations that certain aspects of the research program should be continued.

On July 1, 1955, official responsibility for federal support of synthetic rubber research passed to the National Science Foundation upon the recommendation of the Disposal Commission. The Disposal Commission, at that time, suggested continuance of the program for a trial period running through June, 1956, particularly research conducted through universities and other institutions and the government laboratories operated under contract by the University of Akron.

In the thirteen-year period since its inception, about $30,000,000 in federal funds went into the research program. Last year's budget was $4,160,000. The government laboratory at the University of Akron represents an investment of $2,200,000 which includes the original cost of the facility plus additions.

The special commission named by Dr. Waterman will assist the National Science Foundation in evaluating the long-range role and responsibility of the federal government in the rubber research field. NSF stated that it will also consider several proposals on the future of the Akron laboratories, including possible sale or lease to private industry, to a university or other non-profit institution, or retention and operation by the government.

Recommendations By Year-End

Dr. Waterman states that he hopes the group will complete its study of the entire problem and present its recommendations by December 31, 1955. These findings and recommendations can then be reflected in the proposed legislation NSF will submit to Congress shortly after it reconvenes in January, 1955.

Six scientists and five non-scientists were named to the special commission, in accordance with provisions of the National Science Foundation Act. The commission will name its own chairman and vice-chairman. Members of the special committee on rubber research are:

Scientists — Arthur C. Cope, Department of Chemistry, Massachusetts Institute of Technology; Farrington Daniels, Department of Chemistry, University of Wisconsin; Joseph C. Elgin, School of Engineering, Princeton University; Paul D. Foote, Gulf Research and Development Co.; Edwin R. Gilliland, professor of chemical engineering, Massachusetts Institute of Technology, and Warren C. Johnson, Division of Physical Science, University of Chicago.

Non-scientists — William H. Davis, Davis, Hoxie and Faithful; Frank A. Howard, Standard Oil Development Co.; David D. Henry, New York University; Lawrence A. Kimpton, University of Chicago, and William A. W. Krebs, Jr., School of Industrial Management, Massachusetts Institute of Technology.

Another copy of RUBBER AGE needed in your office? Use the coupon on page 953.

RUBBER-STICHTING REPORTS ON RECENT SURVEY OF LATEX VARIABILITY

Rubber-Stichting, Delft, Holland, recently sent major latex consumers throughout the world a questionnaire soliciting information about the variability of latex. From the 123 replies which were received, Rubber-Stichting was in a position to draw some conclusions as to the difficulties encountered in processes which are sensitive to naturally-occurring variations in latex properties. Some of the other important conclusions are concerned with the effect of latex age and of shipment in drums on variability in processing characteristics.

Rubber-Stichting states that quality and uniformity of Hevea latex are of the utmost importance to latex consumers. Not only the processing characteristics of the compounded latex, but also the properties of the final rubber article will depend on the composition of the raw material. Extensive chemical and physical investigations concerning preserved, concentrated Hevea latex have, therefore, been carried out at Rubber-Stichting under the aegis of the International Rubber Research Board as well as by the research laboratories of latex consumers.

The chemical composition of concentrated Hevea latices of different origin varies only slightly. Nevertheless, the processing behavior is sometimes known to show variations. This may occur even between latices of the same origin but of different shipments. A primary objective of the scientific and technological investigations carried on by Rubber-Stichting was to obtain a better insight into the significance of latex variability, and to find an ultimate solution to any difficulties arising from this variability.

Good Response to Survey

The questionnaire was distributed during the latter part of 1954. A total of 123 replies were received, representing about 50% of the companies involved. Of the manufacturers who returned the questionnaire, 49 produce latex foam, and 49 used latex in the preparation of dipped articles. Of the other manufacturers who returned questionnaires, 11 used processes involving heat-sensitized latex; 11 used latex in the production of thread; 12 used latex in the treatment of textiles including cord impregnation, and 21 used latex in adhesives and similar compounds.

Non-uniform processing behavior of different consignments of the same type of latex was observed by a majority of the manufacturers producing foam, dipped articles, thread, or articles from heat-sensitized latex. These are, apparently, the processes which are sensitive to latex properties, whereas the use of latex in textile treatment appears to be far less sensitive insofar as variations in latex properties are concerned. Variable processing characteristics in adhesives and sealing compounds containing Hevea latex were found by American manufacturers.

Rubber-Stichting states that some of the difficulties encountered in latex processing are often attributed to latex quality or variability. Actually, an uncontrolled step in the manufacturing process may be responsible for the difficulty. In general, it is no easy task for the manufacturer to judge whether variability present in the process and in the compounded stock is due to a variable composition of the raw material or to non-uniform processing.

According to the replies received, the difficulties occurring most frequently (25 to 50% of the replies received) are: (1) In foam rubber manufacture, and (2) In the manufacture of dipped goods, thread and articles from heat-sensitized latex compounds. In foam rubber manufacture, two basic problems were encountered: (a) A variable rate of gelling, and (b) Foam collapse during gellation or after the addition of the coagulant.

Problems With Dipped Goods

In the manufacture of dipped goods, etc., two basic problems also manifested themselves: (1) A variable sensitivity of the latex to zinc oxide. This becomes apparent as an undesirable thickening of the compound, or in low storage stability, or by the formation of aggregates which makes filtration necessary, but difficult; (2) Insufficient strength of the wet gel.

Some of these difficulties may be due to non-uniformity of the composition of the latex. The degree of sensitivity of latex to zinc oxide and other gelling agents is often referred to as the "chemical stability" of the latex. Though the desirability of a suitable laboratory method for determining the chemical stability of latex has already long been recognized, the results of the survey stressed the need for the introduction and standardization of such a test as quickly as possible.

Zinc oxide is always present as a component of a compounded latex and various investigations have shown that zinc amine ions which are formed upon solubilization of zinc oxide in latex serum play a dominant role in the most important "cold" and "hot" gelling processes used in latex technology. It is, therefore, obvious that a standard chemical stability test should be based on a measurement of the sensitivity of latex to zinc amine ions in the serum. Rubber-Stichting states that the progress recently made by various investigations in this field may enable the introduction of a chemical stability test in the near future.

Effect of Age Noted

One question in the survey had to do with the effect of age on the variability of the latex. It is well known that the chemical composition and some properties of fresh Hevea latex gradually change with time. After a fairly rapid change during the first months, a more constant level is maintained. It might, therefore, be expected that more constant and uniform properties will be found in latex which has been allowed to age for several months. Some large consumers of latex have taken note of this fact and, if possible, use only latex that is at least six months old.

Some other manufacturers, however, report increasing processing difficulties with age or the development of undesirable characteristics, like foul odor, formation of coagulum, etc. The last mentioned effects may be attributed to insufficient preservation or improper storage conditions. The increased processing difficulties, however, may be connected with the decreasing chemical stability of latex in storage. This must be duly accounted for when processing aged latex. Optimal processing behavior may probably be obtained if the age of the latex is confined between certain limits. In this respect, it should be an advantage for the latex consumer to know exactly the age of every consignment of latex.

The most important factors responsible for the variability of latex appear to be the origin of the latex (botanical stock, location), the season of tapping (effect of wintering or defoliation of the trees), methods of preservation and storage and the age of the latex. The latex producer should be able to control properly most of these factors except the effect of seasonal variations, the age of the latex and the storage conditions after shipment.

Notwithstanding the considerable success achieved by latex producers in order to deliver a uniform latex, it will remain necessary for the latex consumer to control latex quality by application of suitable tests that give reliable information about the adjustments to be made in latex compounding and processing, Rubber-Stichting states.

Texas Butadiene Names Bowen

Texas Butadiene & Chemical Corp., Houston, Texas, has announced the appointment of K. D. Bowen as vice-president. Mr. Bowen is well-known in the chemical industry, having been associated with the Dow Chemical Co. for seventeen years in various capacities, including manager of the Texas styrene plant. In 1946, Mr. Bowen left Dow to join the Celanese Corp. of America as manager of their first chemical plant located near Bishop, Texas. He became manager of plant operations of the Chemical Division of Celanese in 1951. In 1953, he was transferred to Charlotte, N. C., as director of manufacturing coordination for the corporation. Mr. Bowen resigned this position effective August 1, 1955, to assume his new responsibilities with Texas Butadiene.

Murawski Leaving for Europe

P. P. Murawski, well-known wire specialist of the Elastomers Division of E. I. du Pont de Nemours & Co., is scheduled to leave the states on October 7 for an extended tour of Europe. Mr. Murawski will call on public utilities companies in several countries, including England, France, Germany, Holland, Switzerland, Italy and Sweden. He is planning to depart by air and return by ship. The trip is expected to take approximately three months.

N. Y. RUBBER IMPORTERS SEEK CENTRALIZED HANDLING SET-UP

According to reports from the trade, Port of New York rubber importers are shopping around for new unloading berths in order to centralize their rubber handling facilities and to obtain cheaper pier storage or demurrage rates. Their announcement came after Vincent A. G. O'Connor, Marine and Aviation Commissioner, said New York City officials were fighting to keep the $318,000,000 rubber importing business from moving to Port Newark, controlled by the New York Port Authority. Mr. O'Connor proposed to consolidate the rubber unloading operation at Piers 10, 11 and 12, Stapleton, Staten Island, N. Y., which were recently vacated by the Army Port of Embarkation. The work is now concentrated in Staten Island and Brooklyn.

Steamship line officials called the idea impractical for either port, and not even all rubber importers give unqualified support to the program. The truckers who haul the huge bales of rubber and the weighers who weigh and sample it prefer Staten Island.

Representatives of the Rubber Trade Association who favor the project argue it would be cheaper to have a centralized spacious terminal equipped with special machinery to handle the 250-pound bales. Space is important, they say, because there must be room to weigh, sort and mark the bales before they leave the pier.

Cites Demurrage Rates

An association spokesman said importers were paying between $300,000 and $500,000 a year in demurrage rates. He contended this was excessive and weighed as heavily as the desire for a central terminal in the traders' decision to cast about for new unloading facilities.

The Far East Conference, an organization of steamship companies in this trade, allows a "free time" period of five working days in which the importers can get their rubber off the pier. A compensatory rate of five cents a hundred pounds is charged for the next five calendar days. It jumps to ten and twenty cents respectively for the second and third five-calendar-day periods. A conference member said the rubber importers had not yet demonstrated that they needed the extra time. When they do, we will give them some consideration, he added.

The rubber importers asked the conference early this year for ten free days, the maximum allowed under a Federal Maritime Board ruling. They pointed out that before the war the former Maritime Commission granted fifteen free days, and that the Conference was permitted to reduce the time to speed up cargo movement during the war. The importers feel they could get more free time at Port Newark by dealing directly with the Maritime Board.

Some steamship company officials do not want a centralized rubber unloading terminal. For one thing, there is no way to schedule the arrival of rubber shipments to prevent periods of congestion or to avoid slack periods. They also pointed out that a ship would have to shift two or three times to unload all its rubber cargo at one pier. This is because these cargoes are loaded at several ports and it is not possible to separate the rubber from the general cargo at each port.

Another steamship company official, who has leased piers at the New York Dock Co. in Brooklyn, complained that the New York Port Authority, which recently took over that section of the waterfront and thereby became his landlord, is collecting his rent in Brooklyn and is urging his customers to send their rubber cargoes to Port Newark.

Borough President Cashmore of Brooklyn has also voiced opposition to the Port Authority project. Commissioner O'Connor said his department has retained a consulting engineering firm, Tippetts, Abbett, McCarthy & Stratton, of New York, to make a study of the rubber industry's requirements and of the facilities needed to handle the cargoes efficiently.

When completed, the study will be presented to the Rubber Trade Association. Conferences will be held with the Rubber Manufacturers Association, the Far East Conference, comprising ship lines in the trade, and representatives of the Federal Government.

SEVERAL RECENT APPOINTMENTS ANNOUNCED BY UNITED CARBON CO.

E. E. Neyland

D. A. Reneau

C. W. Carroll

United Carbon Co., Charleston, West Va., has announced several recent appointments to its staff. Ellsworth E. Neyland, formerly associated with the Seiberling Rubber Co. as director of purchases, has joined United Carbon in a consulting capacity in connection with its synthetic rubber operations. Douglas A. Reneau, associated with the construction and production departments at United Carbon's Aransas Pass, Texas, carbon black plant for the past fourteen years, has joined the company's sales staff as southern district sales representative. Charles W. Carroll, formerly a purchasing agent for the B. F Goodrich Co. at Akron, Ohio, has been named Akron district representative for United Carbon. W. Frank Chandler has been promoted to the post of director of transportation for the company and all its subsidiaries. Arthur V. Krone, formerly chief of the Traffic Division of the Federal Facilities Corporation in Washington, D. C., has joined United Carbon as traffic manager for the company and its subsidiaries. Mr. Neyland joined Seiberling Rubber when the company was formed in 1921. He served as director of purchases for Seiberling Rubber from 1934 until 1951. During 1951-52, Mr. Neyland served in Washington as head of the Rubber Chemicals and Textiles Divisions of the NPA. Mr. Reneau will serve at United Carbon's Memphis, Tenn., sales office under the direction of southern district sales manager Burton Smart. Mr. Carroll was associated with Goodrich for five years before joining United Carbon. A chemical engineer, he holds degrees from Ohio State University and Miami University.

Phillips to Expand Capacity

Phillips Chemical Co. will expand by 15% its Plains copolymer plant near Borger, Texas, to meet increased customer demands for "Philprene" synthetic rubber, according to a recent announcement. Construction of the new facilities will begin immediately and is expected to be completed by September, 1956. The copolymer plant and the adjacent butadiene plant were purchased by Phillips from the government in April, 1955. Phillips had previously operated the plants for the government under contract. With these plants under its private ownership and operation, the company makes and sells to rubber fabricators many types of synthetic rubber materials bearing its "Philprene" trademark.

Cabot Names Sales Agents

The White Pigments Division of Godfrey L. Cabot, Inc., Boston, Mass., has announced the appointment of two new sales agents for sales of "Wollastonite" in the United States. The Robert F. Sheahan Co., Memphis, Tenn., will be responsible for sales of Wollastonite in the middle-south area, in a territory which includes Tennessee, west of Nashville; Arkansas, Louisiana, Mississippi and Alabama. Deeks & Co., Atlanta, Ga., will be sales agents for Wollastonite in the southeastern United States, in an area which includes eastern Tennessee, including Nashville; Georgia, North and South Carolina.

FLOOD-DAMAGED PLANTS REPORT GOOD PROGRESS ON RESTORATION

Rampaging flood waters which hit several eastern states in the middle of August were reported to have halted or impeded operations at several plants. As soon as the flood waters had abated, however, the effected plants began making rapid progress toward a full production schedule. U. S. Rubber Co. reports that it is making every effort to get its five flood-damaged plants in Connecticut, Rhode Island and Massachusetts back into full production.

H. Gordon Smith, executive vice-president, stated on August 22, that "The company's personnel at each plant already have recovery and repair work well under way. Engineering, production and safety personnel from New York and other locations have been rushed to Naugatuck, Conn., and Woonsocket, R. I., the areas hardest hit by the floods, to help restore employment and service to customers.

"Truckloads of steam, water and fire hose from the company's mechanical goods plant in Passaic, N. J., and electrical wire and cable from its Bristol, R. I., wire plant are being rushed to the stricken plants to help restore power and rectify the damage. The company also expects to make up for part of the loss of production in the plants hit by the flood through production increases in other similar plants located in other sections of the country.

Damages in Millions

"It will not be possible," Mr. Smith said, "to obtain an accurate estimate of the cost of the flood for several days and possibly several weeks. However, it now appears that total damage to the five plants may run as high as $5,000,000 to $10,000,000. The plants were not covered by flood insurance because it is extremely costly and nearly impossible to obtain."

It was reported that damage to the Naugatuck, Conn., footwear plant was severe, with payroll records lost and many mills, Banbury mixers and calenders out of operation. The plant started shipping footwear products to customers from warehouse stocks on August 29. It was expected that some production would be resumed by the middle of September and that full production would be resumed the month following.

Chemical Plant Damage Severe

Damage to the chemical plant at Naugatuck was also severe, principally to inventories of raw materials and finished goods. The production facilities for reclaimed rubber were the hardest hit. The rest of the plant was able to resume operations as soon as power had been restored.

Damage to the synthetic plant at Naugatuck was slight. Full operations were resumed as soon as power had been restored.

The footwear and foam rubber plant at Woonsocket, R. I., reported moderate damage. Shipments to customers started within a few days after the flood waters had receded. Partial production was expected to begin in the middle of September with full production by the middle of October.

The tire plant at Chicopee Falls, Mass., reported slight damage with interruption of power the principal problem. As soon as the power was restored, the plant began curing tires.

Other than U. S. Rubber, the Farrel-Birmingham Co., Inc., with plants at Ansonia and Derby, Conn., also suffered damage when the Naugatuck River flooded on August 19. Although some of the company's large shops were inundated in water as high as twelve feet from the floor level, the disaster was flash-flood in character and the water receded to normal overnight. This gave the opportunity for expeditious, hard work to effect very high salvage. The company reports that prospects are good for an early return to full operations. The company has prepared a full flood report which gives an account of how the company's plants at Ansonia and Derby, Conn., fared as a result of the flood disaster in the Northeast. Ask for Flood Report Bulletin No. 60.

The Derby and Shelton, Conn., plants of the Sponge Products Division, B. F. Goodrich Co., were also hit by the flood of August 19. Operations were suspended as the flood waters began to rise. Slowly receding water made it difficult for company officials to evaluate the extent of damage to the plants.

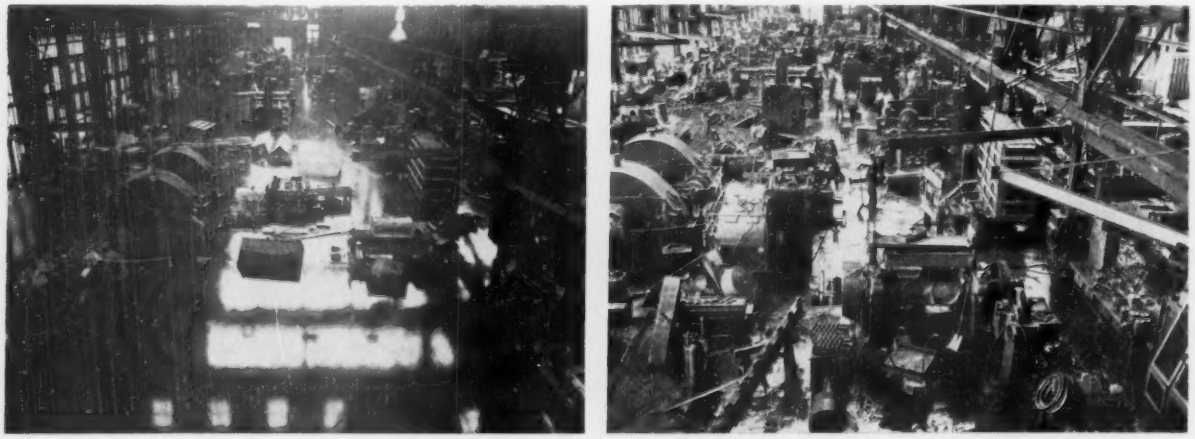
Goodrich believes that most of the damaged raw materials can be salvaged. Production has resumed, but a full estimate of the damage is not available. The company reports that no major buildings were destroyed and there was little if any structural damage. The isocyanate plant was not damaged, Goodrich reports.

Acquires Industrial Synthetics

American Hard Rubber Co., New York, N. Y., has announced the purchase of the assets of the Industrial Synthetics Corp. including the wholly-owned subsidiary, the Supplex Corp., both firms of Garwood, N.J. The firms are leading manufacturers of plastic lawn sprinklers and garden hose under the brand name "Supplex". V. T. Norton, president of American Hard Rubber, stated that Albert A. Kaufman, president of both Industrial Synthetics and Supplex, will continue his active interest and participation in the companies. In addition, he will join the management group at American Hard Rubber as a consultant to expedite the development plans of that company. Mr. Norton stated that the acquisition of Industrial Synthetics completes another step in American Hard Rubber's plan to expand and diversify its business.

Introduces New Synthetic Latex

General Latex & Chemical Corp., Cambridge, Mass., has introduced "Vult-S 8-VX-5" a butadiene-styrene copolymer latex designed to have high water resistance in many fields of utility. The new product finds use in paper laminates, carton and paper-to-foil adhesives; functional or decorative coatings on wood, plaster, fabrics, etc.; as a saturant for masking tape, artificial leather, impregnated paper for wet abrasive operations, gaskets, etc.



Shown above are two views of the erecting shop of the Farrel-Birmingham Co. at Ansonia, Conn. The photograph to the left shows the shop as it appeared during the flood on August 19. The water eventually rose to a height of nine feet. The photograph to the right shows the same shop two days later. The water has receded and clean-up and salvage work is well underway.

THERMOID MANAGEMENT SLATE WINS OVER INSURGENT GROUP

The management of the Thermoid Co., Trenton, N. J., has won a six-to-one victory over an insurgent stockholder group which had sought to unseat it. The official tally of ballots cast on August 26 for opposing slates of directors was announced on August 30 at which time it was revealed that the management slate headed by Warren E. Hill, president, had 623,287 votes against 98,630 for the opposition slate.

Both sides filed general challenges of all proxies submitted by the opposing group. In filing his challenge, Raphael Elias, New York attorney and secretary of the stockholders' committee, stated that the filing was a matter of routine, "in case we decide to contest the matter further." When asked about the possibilities of further court challenges, Mr. Elias said "it is under consideration." Mr. Elias congratulated management on its victory and added "it is my sincere hope that Thermoid will prosper under their leadership."

The stockholder decision came after two months of proxy campaigning by the opposing sides. The stockholder committee was formed and announced its intention to unseat the Thermoid board shortly after the company's 1954 annual report disclosed there had been manipulation in Thermoid's accounts for the purpose of reducing income taxes. The Internal Revenue Service is investigating these manipulations and the company has set aside $885,000 to meet anticipated additional taxes.

Several Court Battles

The Thermoid proxy contest was accompanied by a rash of court battles over the manipulation, the time of holding the annual meeting, and other procedural matters. Still pending in New Jersey Superior Court is a stockholders' suit against five former officials, asking they be declared guilty of breach of trust and held accountable for expenses and penalties the company may suffer because of financial irregularities.

The stockholders' meeting on August 26 was adjourned to August 30 so that judges could tally the vote. The meeting on August 30 lasted only 20 minutes and ended with spokesmen for each side expressing appreciation for the sportsmanship of the other; this, in spite of the challenges of proxies in which each side accused the other of material misstatements of fact during the proxy campaign.

The challenge by Mr. Elias contended, among other things, that Thermoid employees were required to solicit proxies and threatened with loss of their jobs unless they did so. It also maintained that Thermoid's former chairman, F. E. Schluter, solicited proxies without filing proxy statements with the Securities and Exchange Commission.

The management challenges claimed the Thermoid Shareholders' Committee falsely represented the cost to Thermoid of the tax manipulation and falsely charged the firm's earnings for the first six months of this year were below last year.

The successful management slate of directors consists of: Mr. Hill, who became president of Thermoid on July 23; W. H. Allen, Trenton, N. J., banker; Chester C. Campbell, retired general works manager of the Otis Elevator Co.; Herbert E. Ryker, industrial management consultant; William S. Weeks, president of the Raritan State Bank, Somerville, N. J.; Harold T. Youngren, retired Ford Motor Co. executive; Hans Eggers, president and a director of the Continental Can Co., Ray Lawson, Canadian financier, and Robert H. Robinson.

BROOKES, TARBOX AND BROUGHTON PROMOTED BY DEWEY AND ALMY

J. G. Broughton

C. E. Brookes

T. C. Tarbox

Promotion of three men to sales manager status, and the establishment of a new district office in Chicago, Ill., highlight an organic chemical field sales expansion program recently announced by the Dewey & Almy Chemical Co., Cambridge, Mass. Charles E. Brookes has been promoted to the position of sales manager-organic chemicals and will head the new field set-up. Reporting to Mr. Brookes will be Tom C. Tarbox, as regional sales manager for the Eastern District, and John G. Broughton, as regional sales manager for the Midwest. Martin, Hoyt and Milne will continue as agents for Dewey & Almy chemicals distributed on the West Coast. Six new men, all specialists in their field, have also been added to the field sales staff.

Charles Brookes, who had been named to head the field sales organization, joined Dewey and Almy in 1952, coming from the Sun Oil Co. where he had sold rubber plasticizers and related products. He has been serving as a specialist on high styrene resins for the past three years. Mr. Brookes is a graduate of Yale University. He will make his headquarters in Cambridge.

Tom Tarbox, newly-named regional sales manager for the Eastern territory, joined Dewey and Almy in 1953. He had previously worked for Standard Oil of New Jersey in both engineering and sales capacities. Mr. Tarbox is a graduate of Syracuse University. He has been a sales representative in the Eastern territory for the past two years, and will continue to operate from Newark, N. J.

John G. Broughton, new mid-western regional manager has been with the firm since 1952. He had previously worked for the Shell Chemical Co. in sales and technical departments. Mr. Broughton received his bachelor of science in chemistry from the University of North Carolina. He has been serving the mid-western area as a sales representative for the past two years. Mr. Broughton will have his headquarters in the new organic chemical sales office located at 310 W. Monroe St., Chicago, Illinois.

Spanish Translation Available

United Carbon Co., Charleston 27, West Va., has announced that a Spanish translation of the paper presented by Dr. Isaac Drogin, director of research, at the Rubber Technology Conference of the Institution of the Rubber Industry in June, 1954, is now available. Copies of the paper, "The Role of Intermediate Level Carbon Blacks in Rubber," in Spanish, may be obtained by writing the United Carbon Co. at Charleston.

Promotions at Minnesota Mining

Minnesota Mining and Manufacturing Co., St. Paul, Minn., has announced the promotion of James E. Corbin to technical director of the Retail Trades Tape Division, and Gordon W. Engdahl to technical director of the Fibrous and Industrial Tape Division. Mr. Corbin has been manager of tape technical service since 1950. He joined the company in 1937 as a technical service engineer and was made supervisor of technical service in 1942. Mr. Engdahl had been technical director of the tape laboratory for the past two years. He was first employed by the company in 1943. In 1949, Mr. Engdahl was made assistant to the plant manager of the Hutchinson, Minn., plant, and in 1951 he became director of product control.

Fire Hits Fairfield Rubber

A flash fire on August 27 is reported to have destroyed the factory of the Fairfield Rubber Co. at Norwalk, Conn. Damage was estimated unofficially at $200,000. Production workers on the night shift escaped unharmed. Local fire officials said the origin of the blaze was unknown.

CONTINUOUS MOLDING PROCESS DEVELOPED BY U. S. RUBBER CO.

Molded rubber parts miles long, compared to an industry limit measured in feet, are now being made by the U. S. Rubber Co., New York, N. Y. The parts are produced by a process called continuous molding which is cheaper, faster and as accurate as press, or conventional molding, the company states. It is far more exact than extruding, and can use lower durometer or much softer rubber stocks. This is important where springiness or compression fit of the part is necessary.

The biggest advantage over press curing, U. S. Rubber declares, is the unlimited lengths in which continuously molded parts can be made with close dimentional tolerances. Theoretically, a part could be made long enough to encircle the globe. Actually, its length is limited by the size reel to be shipped. Customers can cut the exact lengths needed, thus eliminating practically all scrap and reducing the cost of the spliced part.

Currently in production at U. S. Rubber are seals for concrete pressure pipe, forms for concrete slabs and engine mountings. Seals for double windows, sink spray hose and windshield wiper tubing are being tested.

Only one splice per window was found necessary by one window manufacturer who tested the continuously molded double window seal in long lengths. He pointed to obvious savings in time and money when contrasted with the many splices of the six-foot, press-cured lengths he has been using.

The new molding process is expected to be a boon to concrete pipe manufacturers who have found extruded rubber gaskets too hard and not accurate enough. The hard stock required for extruding often causes concrete pipe to break when assembled. Soft rubber stock of continously cured gaskets assures accurate fit, faster pipe assembly and will not cause breakage. On sink spray hose, where exact size for sink fittings is vital, continuous molding has met all tests, U. S. Rubber reports.

1600 Denier Fortisan-36 Yarn

Imminent commercial production of 1600 denier "Fortisan-36" yarn by the Celanese Corp. of America, in addition to 800 denier already announced, will serve to meet the requirements of the mechanical rubber goods industry for a high denier fiber which will permit a reduction in processing costs, George W. Ewald, industrial sales manager of the Textile Division of the company, announced recently. 1600 denier is currently being produced on a pilot plant scale. Fortisan-36, the new super-strong yarn for industry, will come into commercial production in October at the Rome, Georgia, plant. The 1600 denier output is expected to be used in fire hose, V-belts, conveyor belting, high pressure hose and other applications where great strength, low stretch, and dimensional stability are needed.

Amco Plastic Materials Formed

Arthur L. Metzger and Matthew T. Staszak, both of whom have been associated with the plastics industry for over eighteen years, have formed a new company, Amco Plastic Materials, Inc., at 80-96 Fourth St., Brooklyn 31, N. Y. The new company will buy, sell and process all types of primary and secondary thermoplastic materials as well as surplus and job lots. Mr. Metzger recently resigned as vice-president in charge of sales of both the A. Bamberger Corp. and the American Molding Powder & Chemical Corp. of Brooklyn, N. Y. Mr. Staszak also recently resigned as vice-president in charge of production of A. Bamberger and American Molding Powder.

Anaconda Opens New Facility

Anaconda Wire & Cable Co., New York, N. Y., has started production of aluminum wire and cable in a completely new and modern building at Sycamore, Ill. When operating at capacity, the new self-contained factory will quadruple the output of bare, rubber - insulated and synthetic-insulated aluminum wire and cable at Sycamore. The new aluminum mill is fully-equipped wtih automatic machinery for drawing, stranding, and insulating aluminum wire, and is the eighth in a series of expansion steps taken at Sycamore since 1940. In that time, the capacity of the mill has more than tripled.

Israeli Symposium Planned

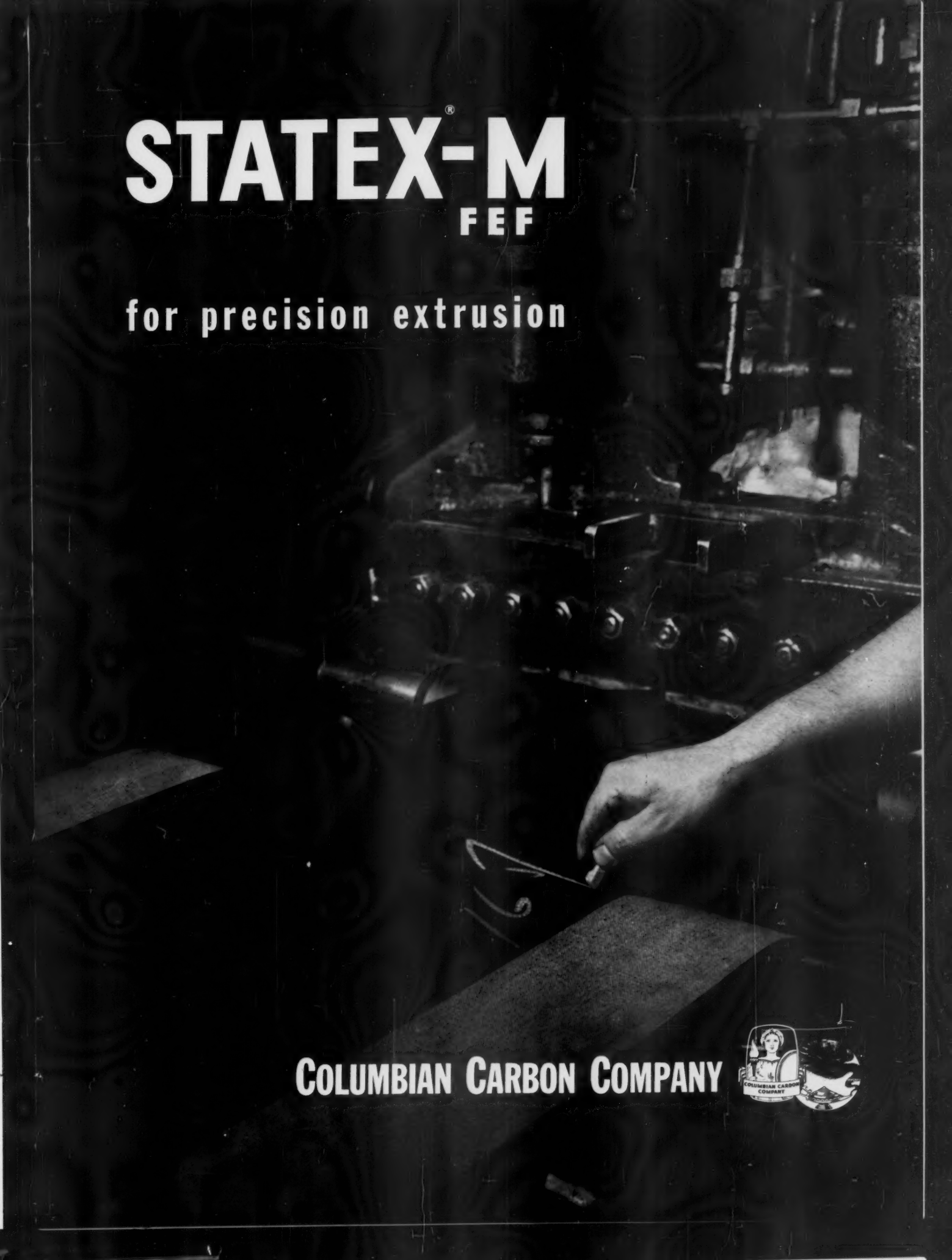
The Commission on Macromolecules of the International Union of Pure and Applied Chemistry and the Weizmann Institute of Science, Rehovot, Israel, have announced an International Symposium on Macromolecular Chemistry which will be held in Rehovot on April 3 to 9, 1956. The symposium will cover three basic topics: (1) General Behavior of Polymers in Solution; (2) General Behavior of Biocolloids and Polyelectrolytes in Aqueous Solution, and (3) Special Polymeric Systems in Solution. A number of interesting papers and activities have been planned for the symposium. Interested parties may address their inquiries to: International Symposium on Macromolecular Chemistry, The Weizmann Institute of Science, Rehovot, Israel.

New Name for Camelback

The National Association of Independent Tire Dealers, Washington, D. C., has launched a campaign to call tire retreading material "tread rubber" instead of camelback. The NAITD pointed out that during the recent Congressional hearings on the proposed financing of federal highway building, there was much confusion over what was meant by the term "camelback." "Tread rubber," NAITD believes, will be a self-explanatory term.

LARGEST TUBELESS EARTH MOVER TIRES NOW IN PRODUCTION AT GOODYEAR

What are said to be the largest tubeless earth mover tires are now in production at the Goodyear Tire & Rubber Co., Akron, Ohio. Known as "Wide Base Earth Movers", size 37.5-33, the first of these huge tubeless tires were mounted on two giant self-loading scrapers, one of which is seen above. The scrapers scoop up as much as 41 cubic yards of earth at one "bite". The vehicles are capable of moving loads up to 100,000 pounds, nearly twice the amount normally handled. The new tires and their extra-wide rims were designed by Goodyear for use with new low air pressures, thus giving the tire greater flotation. Although Goodyear has been manufacturing the Wide Base Earth Movers for some time, the new tires are the first of the tubeless variety as well as the largest earth mover tires. The tires weigh about 2,000 pounds each and cost approximately $5,000 each.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EIGHT LECTURES PLANNED BY AKRON POLYMER LECTURE GROUP

The Akron Polymer Lecture Group has planned a series of eight lectures for the season beginning on September 16. All lectures will be held at the University of Akron, Akron, Ohio. T. R. Paxton (Goodrich Research Center) is chairman of the Lecture Committee with A. E. Juve (Goodrich Research Center) as vice-chairman. N. V. Seeger (Goodyear) is chairman of the Program Committee. L. B. Wakefield (Firestone) is secretary of the group and R. A. Briggs (General Tire) is treasurer.

Other committee members include: F. C. Foster and E. E. Hanson (Firestone), F. F. Miller (Goodrich), Richard Leshin and J. F. Derry (Goodyear), C. E. Greene and O. C. Keplinger (General Tire), Maurice Morton (Akron University), H. L. Wunderly (Government Laboratories-Akron University), M. P. Wagner and N. D. Yaney (Columbia-Southern).

The Akron Polymer Lecture Group has now announced the following lecturers and their subjects:

September 16—"Synthesis and properties of Crystallizable Polyolefines" by Professor Herman F. Mark (Brooklyn Polytechnic Institute).

October 7—"New Polymerizable Monomers Containing Nitrogen and Sulfur" by Professor C. S. Marvel (University of Illinois).

November 4—"Dilute Solution Viscosity" by Professor L. H. Cragg (McMaster University).

December 2—"Some Recent Aspect of Reinforcement" by Dr. W. R. Smith (Godfrey L. Cabot).

January 6—"Polymerization of Organosiloxanes" by Dr. R. C. Osthoff (General Electric).

February 3—"Polyurethanes—A New Plastic Technology" by Dr. E. E. Hardy (Mobay Chemical).

March 2—"Polymer Carbon" by Dr. W. O. Baker (Bell Telephone).

April 13—"Preparation and Properties of Electron Exchange (Redox) Polymers" by Professor H. G. Cassidy (Yale University).

Nopco Chemical to Expand

Nopco Chemical Co., Harrison, N. J., has announced a new expansion program to capitalize on the growing market for polyurethane foam. Ralph Wechsler, president of Nopco Chemical, said that his company would open two new plants this year and a third in 1956. One plant will be located in Los Angeles and another in New Jersey. The third plant, to be built early in 1956, will probably be built in the Chicago area. Mr. Wechsler also announced the appointment of George C. Stier as assistant vice-president in charge of Nopco's Plastics Division. He predicted that the market for urethane foams will increase from a few hundred thousand pounds a year to 100,000,000 pounds by 1960. About 400,000 pounds of the material are now being produced each year, he stated, mainly for development purposes.

U. S. Production and Sales of Rubber Processing Chemicals—1954

Chemical	Production (1,000 lbs.)	Sales: Quantity (1,000 lbs.)	Sales: Value (in $1,000)	Sales: Unit Value[a] (per lb.)
Rubber Processing Chemicals—Cyclic				
Accelerators				
n-Butryaldehyde-aniline	255	246	146	.59
Dithiocarbamic acid derivatives	203	193	368	1.91
Thiazole Derivatives				
2,2′-Dithiobis [benzothiazole] (2,2′-benzothiazyl disulfide)	14,725	10,617	5,017	.47
2-Mercaptobenzothiazole	11,873	3,872	1,491	.39
All Other	20,408	10,328	5,514	.53
All Other Accelerators	5,852	6,264	4,701	.75
Total Accelerators	53,316	31,520	17,237	.55
Antioxidants				
Amino or hydroxy compounds	24,625	23,089	14,103	.61
All Other	26,794	25,223	14,141	.56
Total Antioxidants	51,419	48,312	28,244	.58
Peptizers, tackifiers, inhibitors and blowing agents	5,130	5,299	5,069	.96
Total Rubber Processing Chemicals—Cyclic	109,865	85,131	50,550	.59
Rubber Processing Chemicals—Acyclic				
Accelerators				
Dithiocarbamic acid derivatives[b]				
Dibutyldithiocarbamic acid, zinc salt	654	746	691	.93
Diethyldithiocarbamic acid, zinc salt	1,522	1,436	1,238	.86
Dimethyldithiocarbamic acid, potassium salt	—	119	57	.48
Dimethyldithiocarbamic acid, sodium salt and sodium polysulfide	2,583	—	—	—
All Other	790	1,076	986	.92
Tetramethylthiuram sulfides[c]				
Tetramethylthiuram disulfide	3,839	3,318	3,331	1.01
Tetramethylthiuram monosulfide	855	824	928	1.13
All Other[d]	3,324	2,933	1,570	.54
Total Accelerators	13,567	10,452	8,801	.84
Peptizers, lubricating, conditioning, and blowing agents				
Dodecyl mercaptans	3,843	3,638	1,934	.53
All Other	1,966	1,787	866	.48
Total Peptizers	5,809	5,425	2,800	.52
Total Rubber Processing Chemicals—Acyclic	19,376	15,877	11,601	.73
Grand Total Rubber Processing Chemicals—Cyclic and Acyclic	129,241	101,008	62,151	$0.62

Notes: (a) Calculated on rounded figures. (b) Data on dithiocarbamates, included in this table are for material used exclusively in the processing of natural and synthetic rubbers. (c) Includes data for small amounts of tetramethylthiuram sulfides for uses other than in the processing of natural and synthetic rubbers. (d) Includes a small amount of tetraethylthiuram disulfide. Source: U. S. Tariff Commission.

3M to Buy Mica Insulator

Minnesota Mining and Manufacturing Co. of St. Paul, Minn., is negotiating to buy the Mica Insulator Co., Schenectady, N. Y. M. A. Chapman, Mica president, and Herbert P. Buetow, president of 3M, said the sale would not affect Mica's operations in Schenectady. Both presidents said that 3M had reached an agreement with Insulated Products, Ltd., London, England, to purchase 5,364 shares of Mica's 7,500 shares of outstanding stock. The completion of the sale will depend upon 3M's ability to buy the remaining shares, which are distributed among several minority interests, the officials said. Other details of the negotiations were not disclosed.

Cooper Tire Leases Dismuke

Cooper Tire & Rubber Co., Findlay, Ohio, has assumed management of the Dismuke Tire & Rubber Co., Clarksdale, Miss., and will operate the facility as the Clarksdale Rubber Manufacturing Corp. Cooper Tire has signed a three-year lease for Dismuke, with option to purchase the company for cash or for Cooper Tire stock. Carl Frye, factory superintendent of Cooper Tire, is now in Clarksdale directing resumption of operations. The Mansfield Tire & Rubber Co. of Mansfield, Ohio, terminated a three-month lease of the Dismuke plant on August 9 after the management of that company and Dismuke stockholders failed to agree in negotiations for future operation of the plant.

NSC RUBBER SECTION PLANNING INTERESTING CHICAGO MEETING

Symposiums on plant medical programs and off-the-job safety will highlight the opening meeting of the rubber sessions at the 43rd National Safety Congress and Exposition in Chicago, Ill., on October 17 to 21, 1955. Alexander N. Chapman, safety supervisor for the Pratt & Whitney Aircraft Division of the United Aircraft Corp., will lead off with a talk on medical programs in large plants. Maxwell C. Weaver, president of the Randall Co., Cincinnati, Ohio, will tell how small plants can reap the benefits from a complete medical program.

The symposium on off-the-job safety will consider both the industrial and community aspects of those accidents that occur to workmen away from the plant. Speakers will be C. B. Patterson, safety and fire protection engineer for E. I. du Pont de Nemours & Co., and Tom Horner, editorial writer for the *Akron Beacon Journal*. The afternoon program on October 17 will also include a talk on rubber industry injury statistics by Arthur R. Pomeroy, safety director for the Ohio Rubber Co.

For the afternoon session on October 18, the rubber industry safety personnel will split into five round table discussions. The groups and the presiding officers are:

Guarding Mills and Calenders—N. C. Longee, safety supervisor, Passaic, N. J., plant, U. S. Rubber Co.

Safety Handling of Flammable Liquids —George H. Burkhardt, safety and plant protection manager, General Tire & Rubber Co.

Supervisory Training — Glen D. Cross, director, safety and supervisory training, Firestone Tire & Rubber Co.

Control of Hazardous Chemicals—Frederick W. Sands, industrial hygienist, U. S. Rubber Co.

Safety in In-Plant Trucking Operations —R. W. Fickes, assistant safety director, Goodyear Tire & Rubber Co.

The same groups will meet in the afternoon on October 19 for resumes of the previous day's discussions. All rubber sessions will be held in the La Salle Hotel in Chicago. T. J. Cain, Jr., safety director of the B. F. Goodrich Co., and general chairman of the NSC Rubber Section, will preside at the general sessions.

On the mornings of October 19, 20 and 21, the American Society of Safety Engineers will sponsor sessions of general industrial interest. Among the topics discussed will be off-the-job accidents, health and safety in atomic energy plants, industrial noise control, the new ASA standard on accidental injuries, handling industrial wastes and new uses of isotopes.

The 1955 exposition will consist of 256 booths displaying all types of accident prevention equipment. All exhibit space in the Conrad Hilton Hotel will be filled with products, equipment and services relating to the promotion of safety, health, first aid, sanitation and general welfare. Special space has been allotted to educational displays sponsored by the American Medical Association, National Bureau of Standards, National Society for the Prevention of Blindness, and Underwriters' Laboratories.

Coming Events in the Rubber Industry

Sept. 22. Southern Ohio Rubber Group, Fall Meeting, Engineer's Club, Dayton, Ohio.

Sept. 23. Northern California Rubber Group.

Sept. 25. Northern California Rubber Group, Annual Family Summer Outing.

Sept. 29. Fort Wayne Rubber & Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Oct. 4. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 4. Los Angeles Rubber Group, Statler Hotel, Los Angeles, Calif.

Oct. 7. Chicago Rubber Group, Furniture Club, Chicago, Ill.

Oct. 7. Detroit Rubber and Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 7. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 14. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 14. Northern California Rubber Group.

Oct. 28. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

Oct. 28. Philadelphia Rubber Group, Fall Meeting, Poor Richard Club, Philadelphia, Penna.

Nov. 1. Los Angeles Rubber Group, Statler Hotel, Los Angeles, Calif.

Nov. 2-4. Division of Rubber Chemistry, A.C.S., Fall Meeting, Bellevue-Stratford Hotel, Philadelphia, Penna.

Nov. 3. Rhode Island Rubber Club, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 10. Northern California Rubber Group.

Nov. 11. Chicago Rubber Group, Furniture Club, Chicago, Ill.

Nov. 13-18. American Society of Mechanical Engineers, Diamond Jubilee Annual Meeting, Hotel Congress, Chicago, Ill.

Nov. 18. Connecticut Rubber Group, Fall Meeting.

Dec. 1. Fort Wayne Rubber and Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Dec. 6-7. Society of the Plastics Industry, Sixth Film, Sheeting and Coated Fabrics Division Conference, Hotel Commodore, New York, N. Y.

Dec. 7. Buffalo Rubber Group, Xmas Party, Buffalo Trap and Field Club, Buffalo, N. Y.

Dec. 9. Detroit Rubber and Plastics Group, Annual Christmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

Dec. 9. New York Rubber Group, Xmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 10. Southern Ohio Rubber Group, Xmas Party, Miami Valley Golf Club.

Dec. 16. Boston Rubber Group, Xmas Party, Somerset Hotel, Boston, Mass.

Dec. 16. Chicago Rubber Group.

Dec. 16. Los Angeles Rubber Group, Xmas Party, Ambassador Hotel, Los Angeles, Calif.

Feb. 9, 1956. Fort Wayne Rubber and Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Feb. 17, 1956. Chicago Rubber Group, Furniture Club, Chicago, Ill.

Mar. 16, 1956. Chicago Rubber Group, Furniture Club, Chicago, Ill.

Apr. 12, 1956. Fort Wayne Rubber and Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Apr. 27, 1956. Chicago Rubber Group, Furniture Club, Chicago, Ill.

Announces Name Change

The Polychemicals Division of the West Virginia Pulp and Paper Co., Charleston, S.C., has changed the name of its lignin-GR-S masterbatch from "Indulin-70-GR-S" to "Polypol S-70". The change was occasioned by the sale of the synthetic rubber plants to private industry and the consequent obsolescence of the term GR-S. In all respects except the name, Polypol S-70 is the same as Indulin-70-GR-S. The material is a coprecipitate of lignin and butadiene-styrene copolymer. The lignin, "Indulin", acts as reinforcing agent.

Buys Goodyear Rubber Sundries

Connecticut Chemical Research Corp., a leading maker of aerosol products at Bridgeport, Conn., has acquired Goodyear Rubber Sundries, Inc. of New Haven, Conn. Goodyear Rubber Sundries formerly produced molded rubber products and in recent years has been making plain and printed plastic film and has carried on general research in the plastic field. A. O. Samuels, president of Connecticut Chemical, said the acquisition is part of a program of diversification. The price paid was not stated.

NEW "NATURAL-LIKE" SYNTHETIC DEVELOPED BY FIRESTONE TIRE

Pilot plant production of a new type of synthetic rubber which promises to replace natural rubber in truck tires has been announced by Harvey S. Firestone, Jr., chairman of the board of the Firestone Tire & Rubber Co., Akron, Ohio. "Patent rights, research data and small experimental quantities of the new rubber are being offered to the Department of Defense and the rubber industry in the national interest of establishing a reliable domestic source of supply of rubber that would be the equivalent of natural rubber for use in military truck tires," Mr. Firestone said.

"Two and a half years ago, Firestone research scientists determined by infra-red and X-ray analyses that this new rubber was essentially the same as natural rubber. Further tests showed that this new type synthetic rubber had physical properties at normal and elevated temperatures equivalent to those of natural rubber, whereas all other synthetic rubbers developed up to 1953 had been deficient in these respects.

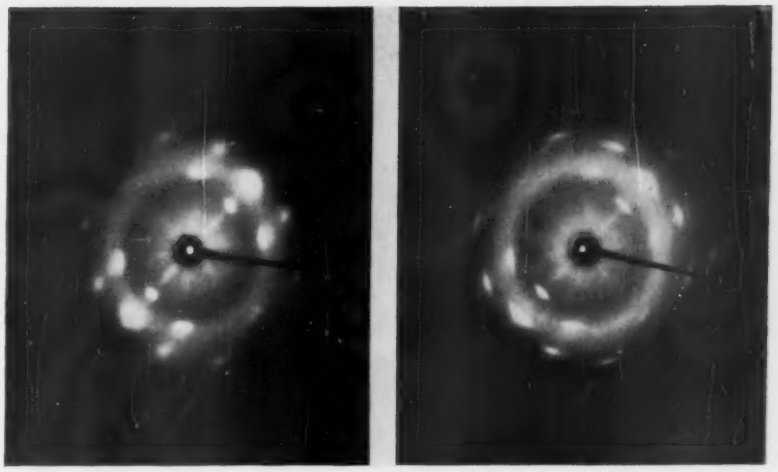
"For two years Firestone has had a pilot plant in production and more than a half-million miles of tire tests have been completed. Development of a synthetic rubber with the properties of natural rubber that could be used in high-speed truck tires has been the goal of scientists for many years," Mr. Firestone said.

"The GR-S type of synthetic rubber, although excellent for passenger tires, is not completely satisfactory for use in all truck tire sizes. Truck tires must withstand higher temperatures because trucks run with heavy loads for long distances, thereby generating intense heat in the tires.

"This new synthetic rubber is easier to work with in the factory than GR-S because it has an inherent tackiness, which was lacking in previously available synthetics. It can be processed and fabricated without application of special processes or additional processing.

"This new rubber is outstanding in its resistance to cracking and the tread wear has proved to be about the equivalent to natural rubber," Mr. Firestone said. "The rubber currently being produced in the Firestone pilot plant is being used for test tires and compounding studies. Nevertheless, small samples for laboratory study are new going to be made available to the rubber industry and other research organizations which formerly operated under industry-government agreements for synthetic rubber development.

"The release of this information at this time concerning this discovery is in our opinion providing a service to the American motoring public and the trucking industry," Mr. Firestone declared.



The X-ray patterns of natural rubber (left) and of the new Firestone synthetic rubber (right) are shown to be almost identical in the above pictures. These pictures were made by passing a beam of X-rays through small stretched samples of rubber and recording the images obtained on photographic plates. Since every material has a distinctive X-ray pattern, the similarity of the patterns of natural and Firestone's new synthetic is particularly significant, although the new synthetic rubber sample was stretched about twice as much as the natural rubber sample to obtain the above pattern. No other synthetic rubber has such a similar X-ray pattern to that of natural, Firestone states. Most synthetic rubber X-ray patterns are simple halos without any crystalline reflections which show up as bright spots.

Stokes Joins Texas Butadiene

Dr. C. A. Stokes, formerly director of research and development for Godfrey L. Cabot, Inc., Boston, Mass., has been elected vice-president and technical director of the Texas Butadiene & Chemical .Corp. of Houston, Texas. Dr. Stokes is also a director of Petrocarb, Inc., New York, N. Y. He had been associated with Godfrey L. Cabot, Inc., for the past ten years.

New York Educational Program

C. V. Lundberg (Bell Telephone Laboratories), chairman of the Educational Committee of the New York Rubber Group, has announced that the group is sponsoring a fifteen lecture course in "Elastomer Technology" beginning Monday, October 3 and concluding on January 30. Classes will meet from 7:30 to 9:45 P.M. at the Engineering Societies Building, 29 West 39th St., New York, N. Y. Because of limited facilities, registration has been limited to the first 125 applications received. If the demand warrants, the course will be repeated. Lectures will deal with the history, economics, chemistry and technology of natural and synthetic rubbers. Polyethylene and PVC, both of which have been increasing in importance in recent years, will also be covered. Inquiries about the course should be addressed to Mr. Lundberg at the Bell Telephone Laboratories, Murray Hill, N.J.

Goodrich Announces Price Rises

B. F. Goodrich Co., Akron, Ohio, recently announced increased prices on several of its rubber products. The price rises range from 6 to 10% on various types of belting, 5.5 to 10% on industrial rubber hose, 8% on shoe products, 5 to 10% on molded industrial rubber items, 11% on rubber bands and as much as 25% on certain miscellaneous items made entirely from natural rubber. R. V. Yohe, vice-president in charge of sales of the Industrial Products Division, said the increases were caused by higher costs of materials along with pyramiding pension and insurance costs. He added that the price of natural rubber has approximately doubled in the last eight months.

Plans to Acquire Respro

General Tire & Rubber Co., Akron, Ohio, is planning a merger of Respro, Inc., Cranston, R. I., into its plastics operations, according to William O'Neil, president of General Tire. The proposed merger is subject to stockholder approval on October 10. It is reported that negotiations for the merger have been completed and that under the terms, one share of General Tire's cumulative preference stock, $100 par value, would be exchanged for 6¼ shares of Respro's capital stock. Over 75% of Respro's stockholders have approved the offer, which is conditioned on acceptance by 66⅔%, Mr. O'Neil said. Respro and its subsidiaries, United Lace and Braid Co., Lion Products Co., and United Chemicals, Inc., manufactures shoe materials, tapes for electrical and other installations, shoe laces, insulation, dress and milinery braid, as well as impregnated and coated, woven and unwoven, rubberized and unrubberized fabrics. Respro employs approximately 350 persons. Upon completion of the merger, Respro would be operated as a division of General Tire under the present management, Mr. O'Neil stated.

Eleanora Building PVC Plant

Eleanora Chemical Corp., a newly-formed subsidiary of the Pantasote Co., has announced plans to build a new plant for the production of polyvinyl chloride in Passaic, N. J. Scheduled for completion in 1956, it will be designed and constructed by Scientific Design Co., Inc., New York. While the capacity of the new plant was not stated, the firm reported that its entire output would be consumed by Pantasote, a leading producer of coated fabrics for the transportation industry and vinyl film and sheeting for draperies, upholstery and shower curtains.

SUBCOMMITTEE XII OF A.S.T.M. COMMITTEE D-11 REPORTS ON MEETING

As reported in the August, 1955, issue of RUBBER AGE, Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing Materials met in conjunction with the 58th Annual Meeting of the parent organization held from June 27 to July 1 in Atlantic City, N. J. Committee D-11 and 23 of its subcommittees held meetings over a three day period. The minutes of the meeting of Subcommittee XII on Crude Natural Rubber have now been made available. Subcommittee XII met on June 29. Norman Bekkedahl (Bureau of Standards) is chairman of the subcommittee. The minutes of the meeting follow:

The chairman of the subcommittee submitted for discussion "Proposed Tentative Specifications and Methods of Test for Smoked Sheet and Pale Crepe Natural Rubber." These specifications would include maximum or minimum limiting values for (1) volatile matter, (2) harmful dirt content, (3) ash, (4) copper, (5) manganese, (6) rubber hydrocarbon, and (7) vulcanization characteristics. The vulcanization characteristics are to be determined by (a) time of incipient cure, (b) cure index, and (c) strain under a load of 5 kgs/sq. cm.

These ASTM specifications, if and when they are developed and approved, are not intended to replace specifications for Rubber Manufacturers Association or Singapore Chamber of Commerce Rubber Association No. 1 and No. 1X grades of smoked sheets and pale crepe crude natural rubber but to supplement these latter specifications wherever desired.

Sampling Method Required

In the discussion of these proposed specifications it became apparent that an acceptable sampling method was first required. Subcommittee 28 on statistical quality control has been assigned to assist in this problem. Also, the sampling method would have to be in accordance with RMA procedure, or if a new and more satisfactory method is developed, it would have to be acceptable to the RMA.

The proposed maximum dirt content figure of 0.05% was thought by one member to be too low. However, this figure was recommended by the Indonesian producers, who have made considerable study on the dirt content of plantation rubbers. A review of work on the dirt content of crude natural rubber by the Indonesian Rubber Research Institute and the British Rubber Development Board was suggested in connection with these proposed ASTM specifications.

For the determination of volatile matter the mill method was considered to be the most practical, and a conference with Subcommittee XIII on synthetic elastomers will be required here. A discussion with the RMA will be necessary on volatile matter also.

In connection with the determination of cure characteristics, the relationship of water content to cure rate does not seem to have been thoroughly established. Also, there is the question of the amount of water in crude rubber and the additional question of the effect of the amount of water in the compounded stock prior to cure. Milling the compounded stock at 70°C. and storing in a closed container until it is cured was suggested as a probable test method.

It was pointed out that the amount of milling which the sample would undergo when used for the determination of volatile matter might make it necessary to use a separate sample for the strain test.

Copper and manganese limits, not only as separate but also as total values, might be required.

The proposed minimum value of 94% for the rubber hydrocarbon content was considered to be too high and a figure of 93% was suggested.

Stress-Strain Test Discussed

Although the rubber producers are using the strain test to classify natural rubber, many rubber manufacturers in the U.S.A. are not equipped to make the strain test. It was suggested, therefore, that the regular stress-strain test might be added as an alternative if agreement on the value of the limits could be reached.

A program of experimental work to establish and support the proposed specifications and methods of test will be developed so that tests may be made in both dry and wet areas of the United States.

In developing and establishing these specifications for crude natural rubber, liaison with the crude rubber committee of the RMA will be made in order that specifications acceptable to both producers and consumers may be provided. The forthcoming London conference in October between producers and consumers of natural rubber was suggested as a place for further discussion of ASTM efforts to develop technical specications for crude natural rubber.

Jacobs Retirement Announced

J. Frank Jacobs, a prominent figure in the tire and petroleum industries for more than forty years, and credited with being the organizer of the nation's first chain of "one-stop automotive service stations", has announced his retirement. A specialist in tires and tire engineering, Mr. Jacobs had been associated with the Pure Oil Co. for the past twenty-one years. For the past ten years, he has been Pure Oil's special representative at the Mansfield Tire & Rubber Co. at Mansfield, Ohio. Mr. Jacobs started his career in the tire industry upon leaving engineering studies at West Virginia Wesleyan University. In 1910, he became associated with the firm of Morgan and Wright which later became a part of the U. S. Rubber Co. Later, he organized a chain of six automotive service stations known then as "Deluxe Service". These he later sold to the Firestone Tire & Rubber Co. Still later he became associated with the Firestone sales organization. Mr. Jacobs joined the Pure Oil Co. in 1934 as a division manager with headquarters at Clarksburg, West Va. He directed the development of Pure Oil automotive centers throughout what is known as the mountain district. Later, he was assigned to Pure Oil's headquarters office in Chicago, and later to Akron, coming to Mansfield in 1945.

3M Forms New Section

The Irvington Division of Minnesota Mining & Manufacturing Co., Irvington, N. J., has announced the creation of a new Special Products Section. John W. Apgar, formerly assistant to the general manager of the Coating Division, has been promoted to manager of the new section. The new section will handle the development and sales of all non-electrical products of the automotive, aviation and general industrial fields. Products such as coated neoprene, silicone, oleoresinous and vinyl are among those to be developed and sold. Mr. Apgar has a wide background of experience with Irvington since 1928.

TESTIMONIAL DINNER IN NEW YORK MARKS RETIREMENT OF E. B. CURTIS

As reported in the August, 1955, issue of RUBBER AGE, *E. B. "Curly" Curtis, long-associated with tthe R. T. Vanderbilt Co., recently announced his retirement. The photograph above shows Mr. Curtis and some of his many friends in the rubber industry at a special testimonial dinner tendered in his home on July 29 at the Chemists' Club in New York City.*

GODFREY L. CABOT ANNOUNCES SEVERAL STAFF APPOINTMENTS

Godfrey L. Cabot, Inc., Boston, Mass., has announced several organizational promotions and appointments. J. Boyd Britton has been elected operations vice-president, and William M. Loving has been elected vice-president and manager of the Carbon Black Division of the Cabot Carbon Co., a subsidiary of Godfrey L. Cabot. Mr. Britton will administer and coordinate the work of the research and development, personnel and organization, technical service and public relations departments, production planning and control, and sales service of the organization.

A 1929 graduate of Washington University with an A.B. degree, Mr. Britton was formerly associated with a petroleum concern before joining the Cabot organization as a sales representative in 1937. In 1942, he became assistant sales manager, and in 1945 was made assistant to the vice-president. He became executive assistant to the operations vice-president of the Cabot organization in 1951.

Mr. Loving was graduated from the University of Denver in 1929 with a B.S. degree in chemical engineering. He was associated with a rubber concern before joining Cabot as a chemical engineer in 1930. In 1940, Mr. Loving became director of the research and development department of the Southwestern Division. In this work he was closely connected with all phases of carbon black developments from plant design to quality control. In 1954, he was promoted to executive assistant to the general manager of the Carbon Black Department.

Names New Sales Managers

The company has also announced the appointment of two new regional sales managers. Donald Simonds has been named regional sales manager of an area which includes the central part of the United States as far west as Denver, Colo. He will maintain headquarters at Akron, Ohio. Daniel B. Doherty has been placed in charge of sales for the eastern division with headquarters in New York City. Ferd Nadherny has been named assistant to Mr. Simonds. Mr. Simonds was graduated from Tufts University in 1937 with a B.S. degree in chemistry. After completing research at Harvard University, Mr. Simonds joined the Cabot organization in December, 1939. In May, 1946, he was appointed assistant general sales manager and in December, 1951, he was named Akron office manager.

Mr. Doherty joined the Cabot organization in July, 1936, following graduation from Harvard University with an A.B. degree in chemistry. He served as a member of the technical sales staff at Akron, Ohio, and in January, 1954, was transferred to New York. Mr. Nadherny, newly-appointed assistant to Mr. Simonds, was graduated from Yale University in 1950 with an A.B. degree. He was graduated from the Harvard University School of Business Administration in July, 1952, with the degree of M.B.A. Mr. Nadherny has been associated with the Cabot organization since that time.

W. M. Loving

J. B. Britton

D. Simonds

R. P. Rossman

D. B. Doherty

F. Nadherny

The company further announced that Raymond P. Rossman has been appointed director of research and development succeeding Dr. C. A. Stokes, who has been elected vice-president of the Texas Butadiene & Chemical Corp., as reported elsewhere in this issue. A 1934 graduate of the South Dakota State School of Mines and Technology with a B.S. degree in chemical engineering, Mr. Rossman received his masters degree in physical chemistry at the Massachusetts Institute of Technology in 1936. He worked as research assistant in the Electrical Engineering Department of M.I.T. before joining the Cabot organization in 1937.

Mr. Rossman started work in the company's Boston laboratory in the Physical Research Section. Later, he became group leader of the laboratory's rubber division. In 1944, he was transferred to Pampa, Texas, as manager of the company's southwestern rubber testing laboratories. He was assigned to the technical department in 1949 as liaison representative between Cabot's production department and customers. Since 1952, he has been assistant sales manager located in the company's Boston office.

Sets Up Project Department

The Cabot organization also announced that it has set up a new Project Department under financial vice-president and treasurer, Louis W. Cabot. Recognizing the importance of new ideas to the company's future growth, the new department headed by Stuart V. Stoddard will direct activities relating to new products and diversification. It will place particular emphasis on realizing the benefits made possible by Cabot research and development. Mr. Stoddard was graduated from Northeastern University in 1941 with a B.S. degree in chemical engineering and immediately joined Cabot as an engineer in the Research and Development Department at Pampa, Texas.

After an interruption of three years in the Navy during World War II, he was engaged in materials handling and customer technical service work until 1950. He was then transferred to England to become a director of Cabot Carbon, Ltd., and works manager of its new plant at Stanlow. In 1952, he returned to the United States to supervise the organization and construction of a new carbon black plant at Sarnia, Ont., and become assistant to the vice-president in charge of miscellaneous operations for the company.

Named to New Army Post

The U. S. Army has announced the appointment of William H. Martin as director of research and development. Mr. Martin, a retired vice-president of the Bell Telephone Laboratories, is now Deputy Assistant Secretary of Defense for applications engineering. It was stated that Mr. Martin will exercise the same degree of responsibility as an Assistant Secretary, and will have complete authority over Army research programs. Mr. Martin received his B.A. degree from Johns Hopkins University in 1909. He took a B.S. degree from the Massachusetts Institute of Technology in 1911, and joined the American Telephone and Telegraph Co. that year. He was transferred to the Bell Laboratories in 1934 when the research and development functions of A.T. & T. were consolidated there. Mr. Martin retired at the end of 1953 as vice-president of the Bell Telephone Laboratories. On January 1, 1954, he was named Deputy Assistant Secretary of Defense.

Increasing Carbon Black Production

Construction of major production facilities increasing by 10% the total annual national output of SRF type of carbon black to meet growing demand, particularly for automotive rubber products, was recently announced by Max A. Minnig, executive vice-president of Witco Chemical Co., New York, N. Y. Mr. Minnig said that new facilities to be located at the Witco-Continental plant at Eunice, New Mexico, will produce 25,000,000 pounds of semi-reinforcing, furnace carbon black specifically to meet automotive requirements. Annual capacity of the Witco-Continental plant at Sunray, Texas, he added, already has been expanded by 6,000,000 pounds of FEF (fast extrusion, furnace) carbon black used in the manufacture of garden hose, wire coatings, flexible tubing and other extruded rubber products.

SRF carbon black, one of the first furnace blacks, has been manufactured by the Witco-Continental group at Sunray, but factors such as the availability of plentiful supplies of natural gas dictated that the new construction be undertaken at Eunice, site of one of Witco-Continental's several channel black plants. The new construction will give Eunice, and the state of New Mexico as well, its first gas furnace carbon black plant. Orders for equipment already have been placed, and it is expected that the new plant will be on stream in the first quarter of 1956. The installation will be directed by Witco-affiliated Continental Carbon Co., operator of the present Eunice plant. Sale of all Continental black production is handled by Witco Chemical Co.

Expanding Plant Facilities

U. S. Rubber Reclaiming Co., Buffalo, N. Y., plans to start work immediately on an addition to its Plant No. 2 in Cheektowaga, N. Y., at an estimated cost of $1,750,000, President Chester H. Peterson said recently. Additional machinery will be installed to produce reclaimed rubber by a continuous process. Mr. Peterson said the new addition will enable the company to transfer part of its operations from its Plant No. 1, but added that the plant will continue its operations. The two plants employ about 450 men. Mr. Peterson said the expansion has been necessary because of the increased demand for reclaimed rubber.

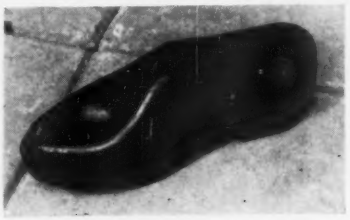
Garlock Acquires U.S. Gasket

Garlock Packing Co., Palmyra, N. Y., has acquired the United States Gasket Co. and the latter's subsidiary, Fluoro Carbon Products, Inc., both of Camden, N. J., according to George L. Abbott, Garlock chairman of the board. Financial terms of the transaction were not disclosed. U. S. Gasket will operate as a wholly-owned subsidiary with no change in its present policies, Mr. Abbott said. The present management staff under A. J. McMullen, president, will remain in charge. U. S. Gasket has 250 employees and annual sales of about $3,000,000.

Holds International Shoe Fair

Rubber applications in the footwear field played an important part of the Fourth International Fair for shoes, leather, leather goods and allied trades held on June 13 to 17 at Utrecht, Netherlands. Rubber in the form of soles, sole and heel plates, shoe edges of solid rubber, removable insoles and foot appliances of latex foam were much in evidence.

A striking feature of the fair was the extent to which the cellular rubbers are being used in the shoe industry. It is estimated that as many as 90% of the rubber-soled shoes exhibited were provided with



A solid rubber Dutch clog on exhibit at the International Shoe Fair.

cellular rubber soles. Of the remaining rubber-soled shoes, about half used crepe soles (principally children's shoes), while the other half were constructed with profile rubber of ordinary or translucent composition or with leather-like rubber.

As for repair materials exhibited, 40% consisted of black and brown sheeting of normal design; 40% consisted of leather-like materials, and 20% were of cellular rubber.

A recent development in the shoemaking field is the direct vulcanization of rubber soling on leather shoes. For the first time, vulcanizing presses for this purpose were shown at the fair, and a great deal of interest was expressed by manufacturers in this equipment.

It may be noted that the famous Dutch clog was not missing from the fair. This time, however, it was not fabricated from wood, but was constructed of solid rubber.

New Plant Nearing Completion

Production at the new $14,000,000 Long Reach, Va., silicone plant of Linde Air Products Co., a division of Union Carbide and Carbon Corp., is scheduled to start this fall, according to R. S. Abrams, plant manager. Several buildings have already been finished, and Mr. Abrams and most of his staff are installed in the combined office and laboratory building. About 600 construction men are busy in the process areas, although this number will taper off as the various units are finished. Training of some locally-employed personnel has already started. About 200 people will be employed by the end of 1955. When presently designed facilities of the plant are in full scale production, it will employ about 350 persons. Linde has been engaged in research and development work in the silicone field since the late 1930's. Its plant at Tonawanda, N. Y., has been in production since 1945, so Linde's total capacity will be considerably increased when Long Reach is completed.

Seeger Discusses Polyurethanes

Dr. N. V. Seeger, rubber research chemist for the Goodyear Tire & Rubber Co., Akron, Ohio, in an address before the 1955 Gordon Research Conference on Elastomers, held on August 1 through 5 at Colby Junior College, New London, N. H., stated that the search for a suitable bonding agent which will enable manufacturers to build a tire that will wear about three times longer than present-day tires, is continuing in full force in the rubber industry's research laboratories. Much speculation has centered about such a tire—which would be made of polyurethane rubber—for the past four years. Although the goal has not yet been reached, he stated, considerable progress has been made. Dr. Seeger in his paper on "Chemigum SL—A Urethane Polymer", pointed out that polyurethane rubbers are vastly superior in wearing qualities to any other known type but they do not mix well with other rubbers. "A tire made entirely of polyurethane would be impractical because of its tendency to generate high heat build-up," he declared. That is why so much experimental work is being done with tires made with just a polyurethane tread over a conventional carcass, Dr. Seeger explained, "and that's where the bonding agent comes into the picture." A bonding agent which will keep the polyurethane tread from separating from the carcass seems to be all that is needed to make the 100,000 mile tire come true, Dr. Seeger stated.

Wire and Cable Symposium Planned

The fourth annual symposium on "Technical Progress in Communication Wires and Cables" sponsored jointly by the Signal Corps Engineering Laboratories and the wire and cable industry, will be held December 6, 7 and 8 at the Berkeley-Carteret Hotel in Asbury Park, N. J. The three-day gathering of leaders in the field will cover the subjects of wire and cable constructions, their characteristics and uses, conducting, insulating and jacketing materials, manufacturing equipment, processes and techniques; field construction practices, and the end uses in operating systems. Companies and agencies which had representatives in attendance at previous symposiums will be contacted. Others desiring to attend are advised to obtain further details from H. L. Kitts, chairman, or H. F. X. Kingsley of the Symposium Committee at the Signal Corps Engineering Laboratories, Fort Monmouth, N. J.

Doubles Polyvinyl Capacity

Doubled facilities for producing polyvinyl acetate polymers and copolymers have been announced by the Dewey & Almy Chemical Co., Cambridge, Mass. The double production was made necessary by increased demand from manufacturers of paint, adhesives and textile sizings. Demand from the paint industry has especially increased, the company said. The added polyvinyl acetate production will come from both the Cambridge and Acton, Mass., plants.

Joins Smithers Laboratories

Robert G. Dunlop

Robert G. Dunlop, well-known consultant to the rubber industry, has assumed active management of Smithers Laboratories of Akron, Ohio. This is said to be the forerunner of a number of expanding changes to be made in the 30-year old organization. Mr. Dunlop's fifteen years' experience in the industry will make available to Smithers Laboratories a wealth of up-to-date experience in compounding, tire development, and tire manufacturing practice, the company states. Mr. Dunlop will continue his consulting activities and will have at his disposal the complete compounding and testing facilities of the Smithers Laboratories. Mr. Smithers founded the laboratories bearing his name in 1925. The Smithers monthly tire examination reports are used by tire manufacturers throughout the world. The laboratories also specialize in the development and application of new materials for use by the rubber industry. Mr. Smithers will continue his association with the laboratories in an advisory capacity.

Arco Steel Fabricators Formed

Automotive Rubber Co., Inc., Detroit, Mich., has announced the formation of a subsidiary company, Arco Steel Fabricators, Inc., with a plant adjoining the parent company's facilities at 12550 Beech Road in Detroit. The new firm will specialize in the design, fabrication, assembly, construction and installation of processing equipment for every phase of industry. In many respects, the new Arco subsidiary will complement Automotive Rubber's rubber processing operations by furnishing the latter with tanks, vessels, pipe, fittings, and a variety of fabricated equipment for the application of corrosion-resistant rubber and plastic coatings and linings. R. A. "Jack" Johnson has been named general manager of the new subsidiary.

George Woloch Moves Offices

George Woloch Co., Inc., has announced the removal of their offices from 82 Beaver St., New York, N. Y., to new and larger quarters at 601 West 26th St., New York 1, N. Y. The new telephone number is Oregon 5-2350.

Houston Plant to Expand

Plans for a substantial expansion of the company's synthetic rubber producing facilities at Houston, Texas, were recently announced by P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., Akron, Ohio. The Houston plant, recently acquired from the government, will be enlarged in two stages which will ultimately provide a 50% increase in capacity. When the first stage is completed, Mr. Litchfield stated, the capacity of the plant will step up from its present annual rate of 137,500 tons to 170,000 tons, including oil—thus making it the world's largest producer of synthetic rubber. This part of the expansion program is expected to be completed and in operation in early 1957, at the time when forecasts indicate growing world demand for raw rubber will be approaching the statistical capacity limits of existing rubber plantations and synthetic plants.

"We are confident that within a few years the world will need more rubber than is now available, so we are moving to beat what could otherwise develop into an acute shortage with runaway prices," Mr. Litchfield said. In providing the first additional 25% capacity increase, underground and other construction work will be done to take care of a future production line of equal size and capacity, so that ultimately the capacity of the plant will be in excess of 200,000 tons.

Cost of the initial expansion stage is estimated by Goodyear at slightly under $6,000,000, a major portion of which goes into the huge reactors, refrigeration units and other fittings required for the plant's output of cold, oil-extended type synthetic rubber. Bids for the construction work and equipment will be sought within a short time.

FINANCIAL BRIEFS

Stockholders of Continental Copper & Steel Industries, Inc., have approved an increase in authorized common shares to 4,000,000 from 1,500,000. Issuance of the additional shares will enable the company to pay a 10% stock dividend that was declared last July 29. The dividend was payable September 12 to stockholders of record on August 30. Continental Copper is a producer of insulated wire and cable through its Hatfield Wire and Cable Division at Hillside, N. J.

Stockholders of the Goodyear Tire & Rubber Co. have subscribed for 888,420 shares, or 97¼% of the 913,531 shares of common stock offered for subscription at $50 a share on a 1 for 10 basis. The unsubscribed portion will be taken up by an underwriting group headed by Dillon, Read & Co., New York, N. Y.

H. V. Gaertner, controller of the B. F. Goodrich Co., has purchased 1,200 common shares of company stock increasing his direct holdings to 6,150 shares.

John H. Dyett, executive vice-president of the Rome Cable Corp., has purchased 1,000 common shares of the company's stock, increasing his direct holdings to 28,187 shares.

General Tire Promotes Buehrle

Victor E. Buehrle, Jr.

General Tire & Rubber Co., Akron, Ohio, has announced the appointment of Victor E. Buehrle, Jr. as technical sales representative for the firm's products for the rubber and reinforced plastics industries. In his new position, Mr. Buehrle will represent General Tire directly on "Gen-Tac" latex and "Glykon" polyester resins. He will also assist General Tire's sales agents on Gen-Tac and other products to the rubber industry. Mr. Buehrle has been promoted from the laboratories of General Tire's Mogadore chemical plant where he was chief control chemist. Before that time he was associated with the B. F. Goodrich Co. He obtained his B.S. degree in chemistry from Kent State University in 1950, and has been an active member of the American Chemical Society and Akron Rubber Group since 1951.

Chicago Rubber Course Offered

The Chicago Rubber Group is once again sponsoring a basic course in rubber compounding at the John Marshall Law School in Chicago, Ill. Classes will begin on October 4 and continue on a weekly basis until April 3. A textbook, believed to be the only piece of literature of its type in the field, will be provided to every enrolled student up to the capacity of the class. The course is limited to a maximum of fifty students. Tuition, including cost of textbook and field trips, is $50. Diplomas certifying satisfactory completion of the prescribed work will be awarded to those students qualifying at the final meeting of the Chicago Rubber Group. Additional information about the course may be secured from Maurice O'Connor, chairman of the Education Committee, c/o O'Connor & Co., 333 N. Michigan Avenue, Chicago 1, Ill.

Raises Heel and Sole Prices

O'Sullivan Rubber Corp., Winchester, Va., has announced price increases of as much as 12% on heels, soles and soling materials. Paul Terretta, executive vice-president of the company, said higher manufacturing and raw material costs were responsible for the advance in prices.

Names in the News

DR. J. P. BERRY has received a one-year leave of absence from the British Rubber Producers' Research Association, London, England, to accept a post-doctorate fellowship at the University of Akron. Dr. Berry will join the rubber research staff at the University on October 1.

J. D. MCMILLIN, formerly technical engineer at the Memphis, Tenn., plant of the Firestone Tire & Rubber Co., has been transferred to the firm's plant in Christchurch, New Zealand, where he will be manager of the development department.

WILLIAM A. KEMMEL, veteran sales executive and manager of the tire sales departments of the Goodyear Tire & Rubber Co., Akron, Ohio, recently marked his fortieth anniversary with the firm.

DR. ROBERT B. MESROBIAN, consultant to the Nuclear Engineering Division at the Brookhaven National Laboratory, has been advanced to the rank of professor of polymer chemistry at the Polytechnic Institute of Brooklyn.

U. C. BROWN, formerly petroleum sales representative for the Firestone Tire & Rubber Co., has been named manager of petroleum company sales succeeding JOSEPH A. "BERT" ADDISON, who retired after 39 years in the tire industry.

WILLIAM M. LARSON, associated with the Goodyear Tire & Rubber Co. since 1947, has been promoted to the rubber and plastics compounding section of the Research Division, Goodyear Tire & Rubber Co.

C. E. CAMPBELL, formerly director of research extension for the United Fruit Co., Boston, Mass., has been appointed technical representative in the Washington, D. C., area by the Velsicol Corp., Chicago, Ill.

NORMAN A. ROSENTHAL, who recently received his Ph.D. degree in polymer chemistry from the Polytechnic Institute of Brooklyn, has joined the Thiokol Corp., Trenton, N. J., as a research chemist.

CLARENCE B. TAFT has been appointed director of product development at Julius Schmid, Inc., New York, N. Y.

FRED ELMER has been appointed manager of the new Vinyl Film and Plastic Sheeting Department of the A. Bamberger Corp., Brooklyn, N. Y.

D. A. CAMERON, formerly industrial sales manager for the Parker Appliance Co., Cleveland, Ohio, has been appointed general sales manager for the firm's three industrial divisions—Tube and Hose Fittings, Rubber Products, and Industrial Hydraulics.

GEORGE L. ABBOTT, formerly president of the Garlock Packing Co., Palmyra, N. Y., has been elected chairman of the board and chief executive officer. ROBERT M. WAPLES, formerly executive vice-president, has been named president succeeding Mr. Abbott.

R. E. BASTIAN, associated with the Firestone Tire & Rubber Co. since 1923, has been named manager of mechanical building succeeding JOHN A. HANSEN, who recently retired.

ALEXANDER S. KELLER, a director of the Niles-Bement-Pond Co., has been named a vice-president. He has also been named general sales manager of the Pratt & Whitney Division.

RUSSEL DEYOUNG, vice-president in charge of production for the Goodyear Tire & Rubber Co., has received a service emblem from the company marking 25 years of continuous association with the firm.

K. W. DOAK, formerly associated with the U. S. Rubber Co., has joined the Polymer Research Department of the Koppers Co. at Verona, Penna.

MYRON H. WILT has been appointed to the Rubber Chemicals Section of the Development Department, Organic Chemicals Division, Monsanto Chemical Co. at Nitro, West Va.

EDMUND CLAXTON, director of research for the Armstrong Cork Co., has been named president of the Building Research Institute, Washington, D. C.

E. B. REYNOLDS, supervisor of sales training for the U. S. Rubber Co., served as a discussion leader at an American Management workshop seminar on the campus of Colgate University on August 29 to 31.

THEOPHIL H. MUELLER, formerly president of Julius Kayser & Co., has been named assistant to the president of the New Jersey Zinc Co., with headquarters in New York City.

CARLTON H. GILBERT, formerly assistant director of advertising for the U. S. Rubber Co., has been appointed director of advertising succeeding THOMAS H. YOUNG, who recently retired after 39 years with the company.

LEWIS F. JOLLY, treasurer of the Armstrong Rubber Manufacturing Co., Des Moines, Iowa, has been elected president of the Iowa Control of the Controllers Institute of America.

ROBERT D. WHITE, formerly associated with Armstrong-Bray & Co., Chicago, Ill., has been appointed branch manager of sales activities of the Hamilton Rubber Manufacturing Corp. in greater New York City.

Appointed Managing Director

Vincent Madsen

Vincent Madsen has been appointed managing director of the Plantation Division of the U. S. Rubber Co., New York, N. Y. Mr. Madsen was formerly deputy managing director of the division. In his new post he will direct all operations of the division which operates plantations totaling 86,000 acres of planted rubber and facilities for processing both dry rubber and concentrated latex in Malaya and Sumatra. The division also has latex storage and shipping plants at Belawan, East Coast of Sumatra, Indonesia and at Sungei Lallang, Kedah, Malaya. In the United States, it has latex unloading facilities at New York and Los Angeles and a latex storage and control station at North Bergen, N. J. Mr. Madsen is presently overseas; henceforth he will divide his time between the rubber company's general offices in New York and the plantations.

A native New Yorker, Mr. Madsen is a graduate of New York University. In 1937 he joined the rubber company as a junior auditor and the following year was transferred to the Plantation Division. He became chief accountant for the Plantation Division in 1941. During World War II he was interned by the Japanese on Sumatra for three and a half years, resuming his career as chief accountant of the plantation division in 1946. In 1949, he was made general manager of Malayan American Plantations, Ltd., and subsequently head manager of Holland-Amerikaansche Plantage, Mij., both wholly owned subsidiaries of the rubber company located in Malaya and Sumatra, respectively. He was appointed deputy managing director of the Plantation Division in 1954.

Wells Named Sales Manager

Richard G. Wells, formerly district manager for the Minnesota Rubber and Gasket Co. in the New York trade area, has been named sales manager of the Minneapolis, Minn., firm. Mr. Wells will supervise the activities of all Minnesota Rubber sales engineers in this country. The firm presently maintains regional offices in fourteen major U.S. cities. Mr. Wells has been active in the sale of industrial rubber products for the past five years, all of them in the New York area. He will now make his headquarters in Minneapolis.

Introduces Kel-F Acids

M. W. Kellogg Co., Jersey City, N. J., has announced the development of a series of perhalogenated, monobasic carboxyl acids which will produce efficient emulsifying systems under the most corrosive, high temperature conditions. According to Kellogg, these acids will meet the growing need for newer types of surfactants that can be used efficiently with strong acids and oxidants. Derived from chlorotrifluroethylene, these "Kel-F" acids undergo reactions involving the carboxyl group. Metallic salts, esters, acid halides, alcohols, amides, nitriles and ketones have been prepared from them. The new surfactants are characterized by high thermal stability, up to 450°F., excellent resistance to strong acids and oxidants; selective reactivity of a carboxylic acid; surface activity in highly acidic, basic or oxidizing media; low vapor pressure; and high density. They are readily miscible in all proportions with most organic liquids. The hexaonic type is miscible in all proportions with water, but the octanoic acid has only limited solubility in water at 25°C. Since their toxicity has not yet been fully determined, normal practices employed for concentrated sulfuric acid must be considered in their use. While these acids and their derivatives are new, indicated uses include promotors for two-phase reactions; additives for metal treating baths; insecticidal dispersants; gelling agents for printing inks, polishes, and lubricating greases; rubber accelerators, antioxidants and stabilizers; and chemical intermediates.

Goodrich Promotes Richard Wise

Richard T. Wise has been named manager of the new Tire Engineering Department of the Tire and Equipment Division, B. F. Goodrich Co., Akron, Ohio. A 1939 mechanical engineering graduate of the University of Cincinnati, Mr. Wise joined the company as a senior draftsman in the Design and Construction Department in March, 1946. He became an engineer and later was promoted to senior engineer in that department before being assigned to the Akron tire plant in 1952 as a process engineer. In his new position, Mr. Wise will be responsible for the maintenance of all Akron tire plant machinery and equipment and for a limited amount of new product development.

Develops New Tire Patch

Self-vulcanizing cold patches to repair tubeless tires are now being made available to its dealers by the Firestone Tire & Rubber Co., Akron, Ohio. The specially developed patches chemically vulcanize themselves onto the tire injury without the application of heat. Firestone said the method makes repairs as strong as those obtained using hot patches and clamps and is as easy as patching an inner tube. Using the new repair kit, injuries to tires as large as 3/16 of an inch can be repaired without the use of internal heat or curing equipment. Permanent repairs can be made to all tubeless tires except those containing a puncture sealant, the company states.

Appointed District Manager

William E. Kelly

William E. Kelly has been appointed St. Louis district manager for the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio. Mr. Kelly replaces J. E. Warner, recently named assistant manager in the Chemical Division's newly-created Coatings Department at Akron. Joining Goodyear in 1949, Mr. Kelly has served as a special representative in New York City. In his new capacity he will provide service on all division products. He received a bachelor of arts and master's degree in physical chemistry from Lehigh University. A native of Lindenhurst, N. J., Mr. Kelly has had extensive experience in the rubber, adhesive and textile fields, and is a member of the American Chemical Society.

Join Goodyear Research Staff

Four men have been added to the Research Division staff of the Goodyear Tire & Rubber Co., Akron, Ohio. The men and their assignments are: Earl R. Kelly, cords and fabrics; Elmer E. Branum, physical testing laboratory; William E. Gibbs, diene synthetic rubbers; and Wallace E. Morrow, organic research. The appointments, announced by Dr. H. J. Osterhof, director of research, are effective immediately. Mr. Kelly attended Ashland College before serving four years in the Air Force. Mr. Branum attended the University of Akron and formerly worked at Goodyear's chemical pilot plant at Akron. Mr. Gibbs received bachelor and master of science degrees in chemistry from the University of Akron. Mr. Morrow received his bachelor of science degree in chemical engineering from the University of Pittsburgh.

Union Carbide to Build Abroad

Plans to build a polyethylene plant near Grangemouth, Scotland, were recently announced by the Union Carbide & Carbon Corp., New York, N. Y. Capacity of the plant will be about 26,000,000 pounds of polyethylene a year. It will be operated by Gemec Chemicals Co., a subsidiary of Union Carbide, Ltd. Output of the new plant will be sold by Bakelite, Ltd., another subsidiary.

Chemical Statistics Handbook

According to the Manufacturing Chemists' Association, Inc., 1625 Eye St., N.W., Washington 6, D. C., the fourth edition of the "Chemical Statistics Handbook" is now available. The 412-page publication is a continuation of the series begun in 1940 and formerly titled, "Chemical Facts and Figures." It contains a wide variety of official information and all available official statistics relating to the chemical and allied products industries for the years 1950 through 1953 with partial data for the first six months of 1954. Primarily a basic reference work, the handbook covers in detailed tabular form such topics as production, employment and wages, wholesale prices, tax data, import-export figures, plus financial records for 100 chemical process companies for 1950-53 as compared with 1939. Individual chemical production is presented in substantially complete form. A special section is devoted to Canadian chemical and mineral statistics. MCA has also announced that it plans to issue current summaries of the Chemical Statistics Handbook on a semi-annual basis beginning this year. The summary will give up-to-date information on a selected list of inorganic and organic chemicals as well as data on employment, wages, hours, earnings, wholesale prices, production indices, imports and exports. The Chemical Statistics Handbook is published in a limited edition at the single copy price of $3.00 postpaid. A special price of $2.50 is extended to public and school libraries and to non-profit institutions.

Join Goodrich Research Center

B. F. Goodrich Co., Akron, Ohio, has announced a number of appointments to its Research Center at Brecksville, Ohio. George Pescan has joined the staff of the Research Center as a technical man in the Physics Department. He was formerly associated with the Hydrair Corp. Manual Esayian has joined the technical service group of the Research Center, while G. Robert Moore has joined as a junior technical man. Dwight M. Wever has been appointed a chemical engineer at the Research Center, and Ray V. Mihailovich has been named a junior technical man. Miss Rose Marie Winch, who was graduated from Ursaline College with a B.S. degree in chemistry, has been named to a junior technical post. Also named to a junior technical post was Robert F. Singer. Charles R. McCulloch, formerly associated with the Republic Steel Corp., has joined the Research Center as a chemist. Delbert W. Rosenbaum has been named a technical man at the Research Center, and Robert J. Minchak has been named a chemical engineer.

Conway Rejoins Union Carbide

John Conway, formerly sales manager of the Hatco Chemical Co., Harrison, N. J., has rejoined the Union Carbide & Carbon Corp., New York, N. Y. Mr. Conway has assumed the duties of purchasing agent for base chemicals and resins. He will maintain headquarters in Union Carbide's New York offices.

Financial News

B. F. Goodrich Co.

Six Months to June 30: Estimated net income of $22,291,357, after provision for all costs including estimated taxes and depreciation, which is equal to $2.52 a common share on the 8,834,402 shares outstanding on June 30, 1955. With the common shares outstanding on June 30, 1954, adjusted to reflect a 2-for-1 stock split effective January 5, 1955, the estimated net income per common share for the first six months of 1954 amounted to $2.16 on 8,427,514 shares. Consolidated net sales for the first six months of 1955 amounted to $372,355,401, compared with $304,935,288 in the corresponding period of 1954. Net sales and estimated net income for the first six months of 1955 included the new B. F. Goodrich Sponge Products Division acquired on August 13, 1954. Net working capital on June 30, 1955 amounted to $230,996,934, compared with $216,653,701 on June 30, 1954. Inventories on June 30, 1955, totaled $135,040,863, contrasted with $123,290,852 on June 30, 1954.

Mansfield Tire & Rubber Co.

Six Months to June 30: Net income of $933,668, which is equal to $1.74 per share of common stock, compared with $287,762, or 52c per share of common stock. Sales in the first six months of 1955 totaled $38,468,754, an increase of 53.97% above the $24,984,955 reported for the first six months of 1954.

New Jersey Zinc Co.

Six Months to June 30: Net income of $2,563,691, which is equal to $1.31 a share, contrasted with $1,723,279, or 88c a share in the first six months of 1954. Operating revenue in the six months ended June 30, 1955, amounted to $10,501,569, compared with $8,158,357 in the first six months of the preceding year.

Pabco Products, Inc.

Year Ended June 30: Net profit of $2,062,944, which is equal to $1.30 a share of common stock, compared with $1,835,491, or $1.15 a share, in the preceding fiscal year.

Okonite Company

Six Months to June 30: Net income of $672,331, which is equal to $3.72 a share, contrasted with $511,413, or $3.01 a share, in the first six months of 1954.

U. S. Rubber Reclaiming Co.

Six Months to June 30: Net income of $152,848, compared with a net loss of $88,490 in the first six months of the preceding year.

Thiokol Chemical Corp.

Six Months to June 30: Net income of $269,028, compared with $130,252 for the same period of the preceding year.

Goodyear Tire & Rubber Co.

Six Months to June 30: Net income of $27,268,497, which is equal to $2.98 each on the 9,155,992 shares of common stock outstanding on June 30, 1955, compared with $24,622,670, or $2.54 per share based on the same number of shares, adjusted for a 2-for-1 stock split and after deducting dividends paid on preferred stock then outstanding but subsequently redeemed. Sales in the first half of 1955 amounted to $679,672,925, an increase of 23% over the $551,346,412 reported for the first half of 1954. Goodyear's financial statement showed a working capital of $413,095,838 on June 30, 1955, and this will be increased by approximately $44,800,000 from proceeds of an offering of common stock recently completed. The company's ratio of current assets to current liabilities at mid-year was 5.3 to 1, compared with 4.7 to 1 the year before.

Minnesota Mining & Mfg. Co.

Six Months to June 30: Net income of $15,969,268, which is equal to $1.92 per common share, compared with $11,644,303, or $1.39 per common share, in the first six months of the preceding year. Net sales in the first six months of 1955 amounted to $131,645,501, against $111,874,966 in the first six months of 1954.

Columbian Carbon Co.

Six Months to June 30: Net income of $3,147,619, which is equal to $1.95 a share, compared with $2,486,348, or $1.54 a share, in the first six months of 1954. Total sales in the six months ended June 30, 1955, amounted to $30,624,512, against $27,155,806 in the first six months of the preceding year.

Lea Fabrics, Inc.

Year to May 31: Net loss of $321,662, which includes a tax credit of $359,797, compared with a net income of $502,388, or $2.39 a share, in the year ended May 31, 1954.

Cooper Tire & Rubber Co.

Six Months to June 30: Net income of $180,628, which is equal to $1.15 a share, compared with $124,613, or 79c a share, in the first six months of the previous year.

O'Sullivan Rubber Co.

Six Months to June 30: Net income of $42,164, which is equal to 6c a share, compared with $39,387, or 6c a share, in the first six months of the preceding year.

Anaconda Wire & Cable Co.

Six Months to June 30: Net income of $3,083,612, which is equal to $3.65 a share, compared with $2,937,162, or $2.91 a share, in the first six months of 1954.

Union Asbestos & Rubber Co.

Six Months to June 30: Net loss of $2,256, compared with a net profit of $291,119, which is equal to 61c a share, in the six months ended June 30, 1954. Net income in the first six months of 1954 excludes a profit of $213,617, equal to 45c a share, resulting from sale of property. Net sales in the first six months of 1955 amounted to $7,044,861, against $7,382,053 in the first six months of the preceding year.

United Engineering & Foundry Co.

Six Months to June 30: Net income of $1,183,589, which is equal to 47c per common share, compared with $1,486,958, or 59c per common share, in the corresponding period of the preceding year. Net sales in the first six months of 1955 amounted to $23,270,386, against $27,246,531 in the first six months of 1954.

United Carbon Co.

Six Months to June 30: Net income of $2,510,138, which is equal to $2.10 a share, compared with $2,008,386, or $1.68 a share, in the corresponding period of the preceding year. Net sales in the first six months of 1955 totaled $19,687,915, against $17,086,626 in the six months ended June 30, 1954.

Circle Wire & Cable Corp.

Six Months to June 30: Net profit of $856,998, which is equal to $1.14 a share, compared with $751,116, or $1.00 a share, in the six months ended June 30, 1954. Sales in the first half of 1955 amounted to $11,416,447, against $9,742,824 in the first half of the preceding year.

Baldwin Rubber Co.

Year Ended June 30: Net income of $734,790, which is equal to $1.70 a share, compared with $1,101,442, or $2.54 a share, in the preceding fiscal year. The report covers the company and its subsidiaries.

Barry Controls, Inc.

Six Months to June 30: Net income of $180,515, which is equal to 61c a share, compared with $168,926, or 69c a common share, in the first six months of the preceding year.

Armstrong Cork Co.

Six Months to June 30: Net income of $7,024,720, which is equal to $1.37 a share, compared with $5,818,450, or $1.21 a share, in the first six months of the preceding year.

Goodall Rubber Co.

Six Months to June 30: Net income of $214,020, which is equal to $1.50 a share, compared with $94,766, or 78c a share, in the first six months of the preceding year.

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Carbon Black in Silicone

The Silicones Department of the Linde Air Products Co., New York, N. Y., has reported that silicone rubber has been cured successfully using carbon black fillers instead of the conventional silica-type fillers. This advancement has been made possible, the company states, through the use of "Linde W-96 Silicone", a new type of gum stock featuring controlled reactivity. Heretofore, Linde believes, it has been impossible to secure satisfactory reinforcement with carbon black fillers in silicone rubber under production conditions. However, the company reports that many of the blacks tested have given reinforcement equal to that obtained with silica fillers. On the other hand, Linde points out, carbon black-filled silicone rubber is essentially an altogether new product, and should perhaps be judged by different standards from conventional silicone rubbers. Linde expects that many new applications for silicone rubber will be opened up by this new development. As an example, one company has molded conductive silicone rubber that will be usable at temperatures above and below the limits of organic rubbers. It is believed that a material of this type will prove useful for such applications as airplane de-icers, where the properties of an organic or silicone rubber alone have not been able to meet the requirements. Linde expects rapid development along these lines, since many of the techniques used in compounding organic rubbers should be applicable to the new silicone rubber.

Cellobond Compounding Resins

Concise technical information on the complete range of "Cellobond Rubber Compounding Resins" is now available from British Resin Products, Ltd., London, England. This group of BRP materials includes rubber reinforcing resins and resins for adhesives. The information is presented in an attractive summary sheet, which has been specially designed to provide—at a glance—detailed information on each Cellobond Rubber Compounding Resin. In addition the summary sheet provides an indication of the main uses of each grade. This publication will be of interest to all engaged in the rubber industry and is available on request from the Information Department, British Resin Products, Ltd., Devonshire House, Piccadilly, London, W. 1., England.

Swift Announces New Plasticizer

"Esterflex B-1", a new type of general purpose primary plasticizer for polyvinyl chlorides and the first in a series of plasticizers to be produced by Swift & Co., has been announced by the company's Industrial Oil Department in Hammond, Ind. The new product is reported to be suitable for use in all types of processing and results of its use on finished products have shown particularly good physical properties. Samples and literature are available from Swift & Co., Industrial Oil Department, 1800 165th St., Hammond, Ind.

Fahr Visiting United States

Dr. Otto Fahr

Dr. Otto Fahr, president and managing partner of Werner & Pfleiderer, Stuttgart, Western Germany, is now visiting the United States where he is conferring with top management of rubber and plastics plants. Werner & Pfleiderer are manufacturers of intensive internal mixers and have just introduced a continuous compounding machine for PVC through their U. S. sales representative, William Tapper, 30 South Broadway, Yonkers, N. Y.

Bellanca Aircraft Sued

Bellanca Aircraft Corp. of New Castle, Del., a recent acquisition of Sydney L. Albert, has been sued for $470,000 in a breach of contract action filed in Federal District Court, Washington, D. C. The suit was brought by Frank C. Mallinson, president of National Electronic Laboratories, Inc., which Bellanca announced it was acquiring in May of this year. National Electronics is a Virginia corporation doing business in Washington, D. C., in research, development, manufacture and sale of electronic equipment. According to the suit, Bellanca Aircraft contracted on May 27 to purchase National Electronics on June 30 in return for 16,000 shares of Bellanca voting stock at $17.50 a share, and other rights. The suit alleges that Bellanca Aircraft failed to go through with the contract, damaging National Electronics by $420,000, and Mr. Mallinson personally by $50,000. Mr. Albert gained control of Bellanca Aircraft in February, 1955, by trading the business and inventory of his general partnership, L. Albert & Son of Akron, rubber and plastic machinery dealers, to Bellanca Aircraft. In return, he received 1,017,250 shares of Bellanca common, or 82% of all outstanding stock.

Opens Sales Promotion Office

Dayton Rubber Co., Dayton, Ohio, has opened new sales promotion and advertising offices in Ashville, N.C., to service the Koolfoam cushioning and textile divisions. Company officials said the move will provide selling support for Dayton production facilities located at nearby Waynesville, N.C. The new offices are located at 100 Fairview Rd., Ashville.

Installs Quality Control Lab

Installation of a modern quality control laboratory in its Chemigum plant in Akron, Ohio, has been completed by the Chemical Division of the Goodyear Tire & Rubber Co. Renovations, including an air filtration system, rebuilt dryer, and new electronic metal detector, are designed primarily to maintain high quality standards. A permanent quality control team is assigned to the laboratory, centrally located in the plant. Team members are responsible for checking purity requirements of both raw and in-process materials. Virtually all equipment in the laboratory is new. Included is a 12-station sending and receiving page system which permits instantaneous communication with the plant manager or department heads at various control points. In addition to the laboratory, production equipment valued in excess of $300,000 has been installed, including the air filtration system and rebuilt dryer. These improvements reduce the possibilty of dust particles or impurities in the air entering the dryer while Chemigum rubber is in process. The electronic metal detector is designed to eliminate the presence of metal contaminants, magnetic or nonmagnetic, in baled Chemigum rubber. The detector electronically "investigates" each bale of rubber before it is packaged. An automatic alarm sounds if any metal pieces are detected by the machine.

To Build New Office Building

Morse G. Dial, president of the Union Carbide & Carbon Corp., New York, N. Y., has announced that the corporation has arrived at an agreement to buy an option held by the New York Central Railroad, which will enable Union Carbide to purchase the long-term leasehold on the entire block between Madison and Park Avenues, and 47th and 48th Streets, in New York. Mr. Dial said that Union Carbide proposes to erect on this site a modern 41-story building for the home office of the corporation and its divisions and subsidiaries. It is hoped that through prompt possession of the site, and by well-planned demolition and construction schedules, the new building can be made ready for occupancy some time in 1958. All plans, however, are subject to the usual contingencies always present in such an extensive construction program.

Exide Announces Lease Plan

Exide Industrial Division of the Electric Storage Battery Co., Philadelphia, Penna., has announced a new plan for enabling industrial users to take full advantage of the efficiency and savings of electric fork and lift trucks with relatively low initial cash outlays. Purchasers of electric industrial trucks may now lease batteries and chargers for periods of up to five years by selecting one of several Exide leasing and purchase option agreements. The effect is to bring average initial outlay for electric trucks within range of the original cost of trucks powered by other means.

News in Brief

Thermoid Co., Trenton, N. J., has announced a new fire engine booster hose called the "Red Devil", which is available in ¾- and 1-inch inside diameter and designed for a working pressure of 800 spi.

Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio, has issued a handy wall chart giving 37 specific, successful suggestions based on plant experience for safely handling solid, liquid and flake caustic soda.

Globe Rubber Works, Inc., Boston, Mass., has announced the opening of a western New England branch at 22 Hanover St., Springfield, Mass.

Fashioncraft Products, 185 - 30th St., Brooklyn 32, N. Y., is manufacturing a new, flip-open picnic bag that has a durable and washable covering and liner made of Krene plastic in smart new colors and textures.

"Women on Wheels," a series of television editorials produced by the American Rayon Institute, will promote Rayon Hi-Test Tubeless Tires on 189 local TV programs during the balance of the year.

Laminated Plas-Tex Corp., Springfield, Ohio, is manufacturing a distinctive and durable new wall covering that achieves its effects by imprisoning leaves, grass, swirling threads, woven cloth and other materials between Bakelite rigid vinyl sheets.

The latest edition of the "Directory of New York Importers and Related Services" is available from the Commerce and Industry Association of New York, Inc., 99 Church St., New York 7, N. Y.

Printing Plate Supply Co., Chicago, Ill., has originated a new, light weight printing plate of Geon vinyl plastic sandwiched between sheets of aluminum and a thin electrotype that is expected to out-perform plates now used in the letter press printing industry.

Fabric Leather Corp., New York, N. Y., is laminating colorful textiles between window-clear, easy-to-clean layers of Krene which are finding use in the summer handbag styles.

A 15-mile irrigation system using rigid Geon vinyl plastic pipe has been installed in an avocado grove near Santa Paula, Calif. The pipe, manufactured by Kerr Industries, Burbank, Calif., is buried underground and expected to last indefinitely.

A hand lotion dispenser, made of composition rubber, and said to be drip-proof, will be introduced to purchasers of Hinds Honey & Almond Cream as part of a national promotion campaign.

Baker Castor Oil Co. has issued a new "Catalog and Product Guide of Castor Oils and Chemical Derivatives". Copies are available from the company's Sales Promotion Department, 120 Broadway, New York 5, N. Y.

General Electric Co. has issued the sixth edition of the "Design File" for rubber-phenolics. Copies may be obtained from the G-E Chemical Materials Department, Pittsfield, Mass.

"Packaging with Plastics" is the title of an illustrated newsletter available from the Bakelite Co., 30 East 42nd St., New York 17, N. Y., summarizing latest packaging developments and applications of plastics.

Minerals & Chemicals Corp. of America, Metuchen, N. J., has released a new technical bulletin on the thickening and gelling of organic and aqueous systems with "Permagel". Request Bulletin SD-30.

A data sheet on its new line of food-handling conveyor belts has been published by the B. F. Goodrich Co. Industrial Products Division.

A booklet describing the new Technical and Sales Service Laboratories of the Enjay Co., Inc., at Linden, N. J., is available from the company headquarters at 15 West 51st St., New York 19, N. Y.

Seven new colors in both roll and tile rubber flooring were introduced by the Flooring Department of Goodyear at the Summer Market in Chicago, Ill. Colors shown included: Cactus Green, Wedgewood Blue, Woodsmoke, Rattan, Surf Green, Ruby Red and Flamingo.

United Air Lines has equipped a commercial airliner in its DC-6 series with tubeless tires manufactured by Goodrich. This is said to be the first time that a commercial airline has adopted tubeless tires as regular equipment.

An electronic brain, known as an "analog", predicts the increasingly high temperatures that aircraft brakes must absorb without failure on heavier, faster planes, now in the design stage, at the Goodrich airplane wheel and brake plant in Troy, N. Y.

A new, highly resilient padding material, composed of nylon fibers bonded with Bakelite phenolic resins, has been developed by Gustin-Bacon Manufacturing Co., Kansas City, Mo. The material is called "Nylabond".

Rain tarpaulins for the New York Polo Grounds baseball infield are made of two sheets of Krene laminated together with a layer of nylon sandwiched between. Known as "Nyvel", the new material was developed by Velveray Corp., New York, N. Y.

Opens New York Office

Rodney Hunt Machine Co., Orange, Mass., has announced the opening of a new office in the Grand Central District of New York City, providing engineering and sales service for the chemical and food process industries of the Middle Atlantic states and Southern Connecticut. Warren E. Hesler, who joined the Rodney Hunt organization in June, 1955, will be in charge of the new office and available for consultation on Turba-Film Evaporators, Rodney Hunt-Luwa Spray Dryers and other Rodney Hunt process equipment. Mr. Hesler's office will be located in Room 2807, Graybar Building, 420 Lexington Avenue, New York 17, N. Y. Mr. Hesler, a graduate of Northwestern Technological Institute, Northwestern University, Evanston, Illinois, holds a B.S. in chemical engineering. He is a member of A.I.Ch.E. and Tappi, and has over nine years' experience in the chemical and food process fields including design and operation of evaporators, crystallizers, filters, spray dryers, and pulp mill equipment. His experience with many processes and many types of process equipment will be available as a further extension of Rodney Hunt's service to the chemical and process industries.

Introduces New Hard Waxes

Synthetic hydrocarbon waxes made from crude contact paraffin wax resulting from the Fischer-Tropsch catalytic hydrogenation of carbon monoxide gases are now being offered by Strohmeyer and Arpe Co., New York, N. Y. Finding use in sunlight protection of oil-plasticized synthetic rubbers, the new waxes will be sold under the brand name of "Roxite Hard Waxes". Pure synthetic hydrocarbon waxes such as the Roxite waxes are high molecular neutral paraffins, mostly of the straight-chain aliphatic type free from saponifiable matters. They may be, however, in a special process, oxidized and converted into a fully acid type of wax containing a high percentage of high molecular fatty and waxy acids.

Mona Fatty Acid Concentrates

Mona Industries, Inc., Paterson, N. J., has announced the availability of a new, additional group of fatty acid amine condensates with greatly increased activity, marketed under the name of "Monamid 150 Series." Compared with conventional fatty acid amine condensates, these new products contain up to 50% more amide than products sold previously as 100% active, the company states. The new products are practically odorless and extremely light in color. They are recommended for detergency, wetting, foaming, emulsifying, thickening, stabilizing and dispersing for every industry.

Barry Expanding Facilities

Barry Controls, Inc., Watertown, Mass., has announced a $300,000 expansion of its facilities. A new building will be erected and the company will renovate an existing structure. Barry Controls produces shock and vibration mounts used for machine tools and in jets and guided missiles.

Nopco Plans Expansion Program

Anticipating a 25,000% increase in the demand for urethane and vinyl foamed plastics in the next five years, Ralph Wechsler, president of Nopco Chemical Co., Harrison, N. J., recently revealed that the board of directors has established a plastics division and has "given authority for a million dollar expansion program of its facilities and organization." The anticipated phenomenal increase in demand for foams, the company said, is based on a market analysis it made during the period Nopco helped develop rigid urethanes for military and commercial use. Currently, it was pointed out, there are about 400,000 pounds of urethane foams produced largely for development purposes. These new foams, it was added, are expected to pass the 100,000,000 pound mark within four years and will not only replace present materials, but will pioneer new products and markets. Plans call for completion of two plants this year with production capacity of 2,000,000 pounds of both urethane and vinyl foams. One installation will be in New Jersey, while the other will be in Los Angeles, Calif. Nopco is also planning on a third to be completed next year, in another location. The New Jersey plant will include the research laboratory, the engineering and applications division as well as the production of vinyl and urethane foams.

Announces Two New Products

Advance Solvents & Chemical Corp., New York, N. Y., has announced two new products, "Advance Brightener M.D.A.C." and "Advabrite M-10". Advance Brightener M.D.A.C. is a fine organic compound which gives a bright blue fluorescence in very dilute solutions in either daylight or ultraviolet light. In clear vinyl sheets, films and molded products, it effectively removes yellowish casts to improve appearance, the company states. When used in pigmented systems, particularly whites, M.D.A.C. contributes to brighter colors. The product has been found to be light stable up to 100 hours in the fadeometer, Advance Solvents states. Advabrite M-10 is a new liquid organic compound which gives a bright blue-white fluorescence in very dilute solutions either in daylight or ultra violet light.

Moving Belt Turns Corners

Hewitt-Robins, Inc., Stamford, Conn., recently unveiled an experimental model of a new passenger conveyor belt, a large scale version of which will be installed at the Dallas Love Field, Texas airport, in 1957. The belt consists, basically, of a rubber sheet, without fabric reinforcement, which is attached to and rides on a series of small flat cars, or pallets. These, in turn, ride on wheels along a track. The rubber is under tension. As a corner is rounded, the outside edge stretches and the inside edge contracts. The big advantage of the new belt, it is said, is that it can carry passengers in two directions on the same belt. In addition, it is claimed that the belt will give passengers a smoother ride than other conveyors.

Hill Elected Thermoid President

Warren E. Hill

Warren E. Hill, formerly executive vice-president of the Plax Corp., Hartford, Conn., has been elected president of the Thermoid Co., Trenton, N. J. Born in Milford, Mass., Mr. Hill attended the Massachusetts Institute of Technology and was graduated in 1924 with a B.S. degree in chemical engineering. From 1924 to 1927, Mr. Hill was associated with the Rockland and Rockport Lime Co., Rockland, Maine, as a research engineer. From 1927 to 1930, he served as construction and operational manager for the Hoosac Valley Lime Co., Adams, Mass. From 1930 to 1949, Mr. Hill was associated with the Pro-phy-lac-tic Brush Co. of Florence, Mass., rising to the post of vice-president in charge of production and administrative coordinator of the Plastic Division. Mr. Hill next served the Continental Can Co. as a plastics consultant. From 1950 to 1952, he was associated with the Shellmar Products Corp., and held the position of executive vice-president. In 1953, he joined the Emhart Manufacturing Co., Hartford, Conn., as vice-president in charge of operations. From 1953 until his election as president of Thermoid, he served as executive vice-president and as a director of the Plax Corp. (an Emhart Manufacturing subsidiary).

Adds to Plasticizer Line

Pittsburgh "PX-220" (diiso decyl adipate), a plasticizer especially suitable for vinyl formulations requiring high temperature processing cycles or low temperature flexibility, is now being manufactured by the Plasticizer Division of the Pittsburgh Coke and Chemical Co., Pittsburgh, Penna. This latest addition to Pittsburgh's broad line of plasticizers offers a combination of low specific gravity, high permanence, very low volatility and excellent low temperature properties in polyvinyl chloride formulations. These properties make PX-220 especially suitable for use in combination with other plasticizers in products such as upholstery stocks, garden hose, tubing, gasketing and electrical insulation. Pittsburgh PX-220 is available in tank cars, tank trucks and drums, and is being shipped from Pittsburgh, Boston, Lyndhurst, N. J. and Los Angeles.

NSC Safety Services Guide

The National Safety Council, 425 North Michigan Ave., Chicago 11, Ill., has made available the "1955 Occupational Safety Services Guide." The new guide provides safety directors with a complete catalog of the many and varied accident prevention aids available from the Council. In the service guide, company safety men will find not only the tools they need to build their plant safety programs, but also the training aids available for instructing supervisors and workers. For the safety man, the 68-page guide provides a list of NSC periodicals, newsletters and a complete library of technical and administrative publications covering all phases of occupational accident prevention. Information on the subjects covered in the basic and advanced courses of the NSC Safety Training Institute also is included. To assist the foreman, the service guide offers a monthly magazine, training films that show supervisors how to use their basic human traits in building a better safety program, and several hundred made-to-order five minute safety talks. A full line of posters, films and booklets are available to sell safety to the man on the job. Individual copies of Service Guide 2.1 may be obtained without cost by writing the NSC.

Stauffer "Conditioned" Sulfurs

Stauffer Chemical Co., New York, N. Y., has developed new surface-conditioned sulfurs with free flowing and blending characteristics which are claimed to be better than any conditioned sulfur offered commercially in the past. Special surface treatment promotes more rapid blending during rubber compounding and greatly reduces "dusting" and attendant hazards from static-induced fires. These sulfurs are particularly helpful and desirable when compounding polymers that are difficult to break down and mix. The process is a departure from the magnesium carbonate treatment which has been standard in the past. These conditioned grades are available under Stauffer's "Tire-Brand" trademark. The mesh specifications on the conditioned sulfurs correspond to standard grades. "Tire-Brand" 21-13 is a 93-95% through 325 mesh material and "Tire-Brand" 21-14 is a finer grade passing 98% through 325 mesh.

Low Ammonia Centrifuged Latex

A new, low ammonia centrifuged latex is now being distributed in the United States by the General Latex & Chemical Corp., New York, N. Y. A product of Harrisons' & Crossfield (Malaya) Ltd., this new natural rubber latex of about 62% solids eliminates deammoniation in the manufacture of latex foam. In addition, it makes odor less objectionable to workers in coating and adhesive applications, and does not retard vulcanization rates. It may even activate vulcanization systems slightly, it is said. Mechanical stability is good and total alkalinity (calculated as ammonia) is extremely low. No "Santobrite" is used in its preservation, General Latex states.

Forms Three New Divisions

Wyandotte Chemicals Corp., Wyandotte, Mich., has announced the formation of three newly constituted divisions, effective September 1. The new Michigan Alkali Division will be made up of the present Michigan Alkali Sales and Manufacturing Divisions, the Research and Engineering Division will encompass present research activities, engineering, production-research and new business-development departments, and the General Products Division includes purchasing, traffic and non-chemical sales and manufacturing operations. This new organization will facilitate the growth and development of the company as well as improve the efficiency of operations and customer service. Concurrently, the board of directors elected Bert Cremers vice-president and general manager of the new Michigan Alkali Division. In his new post, Mr. Cremers will be in charge of the divisional sales activities, as well as the manufacture of all Wyandotte's chemical products, including soda ash, bicarbonate of soda, chlorine, caustic soda, glycols and related products, synthetic detergents, etc.

In 1942, Mr. Cremers was elected to the vice-presidency of the Sales Division simultaneously with the consolidation of Michigan Alkali and J. B. Ford to form the Wyandotte Chemicals Corp. Prior to this, he had been manager of distribution, sales manager, and director of sales for the Michigan Alkali Co.

Newly-elected vice-president Frank Wolcott will head the Research and Engineering Division which has been established to consolidate technical activities and puts greater emphasis on development and marketing of new products. Previously, Mr. Wolcott was vice-president and general manager of manufacturing for the company. He joined Wyandotte in 1951, having formerly been with the New Jersey Zinc Co.

The General Products Division will be headed by its newly-elected vice-president and general manager, George W. Schwarz. This new division's activities includes operation of the company's quarry at Alpena, Michigan, as well as the Wyandotte Transportation Company, also the sale of coke, foundry products, and other non-chemical products and services. Mr. Schwarz has been with the company 12 years as controller, treasurer and vice-president. In 1938, he moved to Wyandotte from his previous association with Ernst & Ernst. Mr. Schwarz is past-president and the past-chairman of the board of Controllers Institute of America and is presently a director-at-large. He is also past-president of the National Association of Cost Accountants.

Koroseal pipe, manufactured by the B. F. Goodrich Industrial Products Division, is getting a tryout for house-plumbing in a model school building erected on the campus of the University of Michigan by its College of Architecture and Design at Ann Arbor, Mich.

Transferred to New York Office

Michigan Chemical Corp., Saint Louis, Mich., has announced the transfer of Carl H. Pfrommer, assistant director of operations, to New York City, where he will join the company's staff for sales and sales service assignments there and in New England. Mr. Pfrommer, who joined Michigan Chemical in 1946, graduated from Lafayette College in June, 1940 with a Bachelor of Science degree in chemistry. He entered the service in April, 1941 in the Chemical Warfare Service as a private, and was honorably discharged in February, 1946 with the rank of captain. At Michigan Chemical, Mr. Pfrommer advanced from foreman to supervisor to assistant director of operations, thereby gaining a thorough knowledge of all of his company's industrial, pharmaceutical and agricultural chemical products. This experience will bring to users of these products a comprehensive background of present product characteristics and will facilitate consideration of new, tailor-made chemicals. His headquarters will be at the company's New York branch office at 230 Park Avenue, New York City.

Airplane Tire Prices Raised

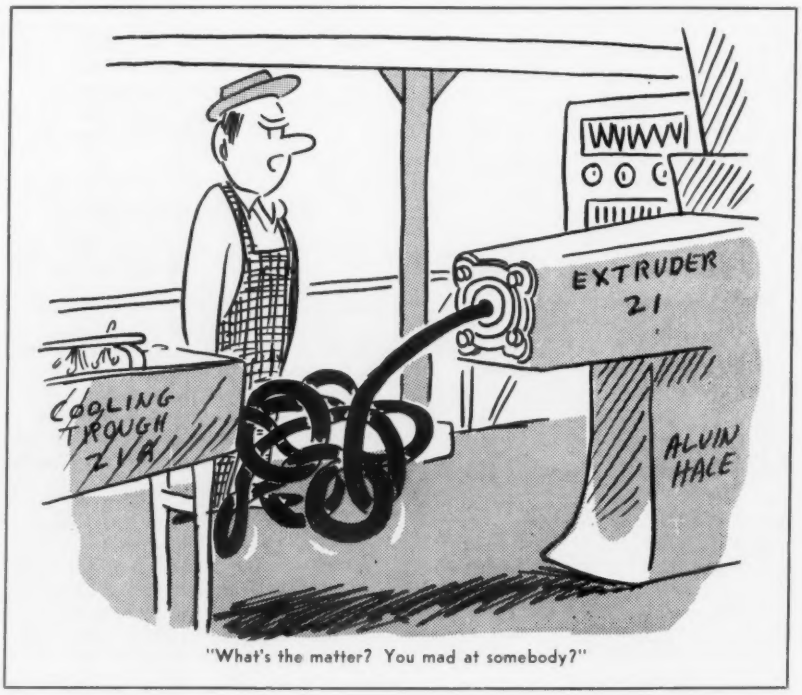
Prices of airplane tires, tubes and retreading materials have been increased from 5 to 7½% by the Goodyear Tire & Rubber Co., effective September 1, 1955. The Aviation Products Division of the company announced the increase in prices as necessary because of a substantial rise in the cost of natural rubber. Cost of new airplane tires, including both the regular and the tubeless type, has been increased by 5%. Prices of new airplane tubes of the regular and fabric base type have been increased 7½%. All types of retreading materials have been increased by 7½%.

Fisk Air-Borne Deluxe Tire

The Fisk Division of the U. S. Rubber Co., New York, N. Y., has announced the development of a new tubeless tire which, it is said, gives more skid resistance and traction than present tires of its type. It is also claimed that this skid resistance and traction actually get better as the tire gets older. The tire has a series of deep claw-like slots in the tread that extend through more than 80% of the tread depth. These claws grip the pavement, improving traction and controlling both side skids and forward skids. Wear makes these claws more flexible and they hold the pavement even more tightly, the company states. New tire skid safety is maintained even when the tire is more than 60% worn. The tire which is called the "Fisk Air-Borne Deluxe," also gives 25% more mileage, virtually eliminates blowouts because of a special carcass construction, and contains an improved air-retaining liner made from a tough new synthetic rubber compound which gives improved puncture protection. Riding qualities have also been improved and tread rows designed to eliminate squeal and hum and give greater steering ease. A narrow white sidewall and new shoulder design add to the styling of the tire and harmonize with the low silhouette of new automobiles, the company states.

Minnesota Mining Promotes Adam

Minnesota Mining and Manufacturing Co., St. Paul, Minn., has announced the appointment of Robert W. Adam as manufacturing manager of the Tape Division. Since 1953, Mr. Adam had been general production manager of tape manufacturing. He joined the company in 1937 as a technician. In 1947, he was made production superintendent of the Tape Division, and in 1948 he became production manager.



"What's the matter? You mad at somebody?"

Condemns Subway Belt Idea

New York City Controller Lawrence E. Gerosa has dealt a heavy blow to the proposal to substitute a passenger belt conveyor system for the thirty-seven year old subway train shuttle between Times Square and Grand Central Terminal. In a recent report to the Board of Estimate, he called the proposed conveyor belt shuttle an expensive experiment involving high maintenance charges and risk of injury to passengers. The board deferred action on the project until its regular meeting scheduled for October 20. "New York City cannot afford to be the guinea pig for such a costly and complex investment, particularly in one of the most congested areas in our subway system," the Gerosa report declared. The proposed conveyor belt system would carry passengers in 120 small square cars whose flat steel bottoms would rest on rubber conveyor belts. The project is estimated to cost $4,100,000. Mr. Gerosa's report stated that no system of mass transportation of passengers in free-riding cars on conveyor belts was in operation anywhere, thereby making impossible the judging of the feasibility, economy or safety of such a project in the light of actual experience. The report said Mr. Gerosa's engineering staff had raised "many serious questions of safety" during its investigation of the conveyor belt project.

Plastisol for Pipe Joints

A series of plastisol compounds specially formulated for the manufacture of vinyl joints for ceramic sewer pipe are now available from the Watson-Standard Co., Pittsburgh, Penna. These compounds, supplied as free-flowing, pourable liquid formulations, may be poured or forced into the mold by using low-pressure pumping equipment. They may also be cured not only by the conventional methods of heating but also by dielectric heating. Pipe joint plastisols available from Watson-Standard are said to have chemical resistance, low water extractability, good low temperature flexibility, low cost, color to meet specification, excellent heat stability, good adhesion to a variety of bonding agents, and, in addition, are non-spewing, cure over a broad range of temperatures, and are easy to handle.

Building Sulfuric Acid Plant

G. L. Bond, president of Consolidated Chemical Industries, Inc., New York, N. Y., has announced the award of the contract to build a 500-ton per day capacity contact sulfuric acid plant. This sulfur burning unit will be built on the Mobile River at Le Moyne, Ala., some 35 miles north of Mobile, on a site adjacent to Courtaulds (Alabama) Inc. Latest engineering features will be included in the design of this unit. Construction will include an office building, machine shop, storage and shipping facilities, in addition to the acid plant itself. Work on the site is under way and construction is expected to be completed late in the second quarter of 1956.

Stauffer Names Haslanger

Robert U. Haslanger

The appointment of Robert U. Haslanger as director of industrial sales of the Stauffer Chemical Co., New York, N. Y., was announced recently by Hans Stauffer, president. Mr. Haslanger, who will continue to make his headquarters in New York City, had been eastern sales manager. The appointment fills the vacancy created by the death, some months ago, of T. A. Haschke.

DuPont Technical Publications

The Elastomers Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has recently issued a number of technical publications of interest. Copies of these publications may be secured from the company. Recently-published technical reports include the following:

"Industrial Rolls of Hypalon" (BL-287).

"Adhesion of Elastomers to Synthetic Fiber Fabrics" (BL-288).

"Aquarex L: An Outstanding, Non-Corrosive Mold Lubricant and Detackifier" (BL-289).

"Tetrone A-Zenite Special for Natural Rubber Latex Foam" (BL-290).

"Hypalon Wire and Cable" (BL-291).

"Neoprene Sponge: ASTM D-1056 and SAE 18R" (BL-292).

"RPA No. 3 and No. 6: Two Excellent Peptizers for Natural Rubber and GR-S" (BL-293).

"Factory Processing of Hypalon Chemical Rubber Compounds Containing Litharge" (BL-294).

"Safe-Processing, Water-Resistant Neoprene Compounds for Wire and Cable Applications" (BL-295).

Moves Eastern District Office

On September 1, the Eastern district sales office of the Rubber Chemicals Division, Phillips Chemical Co., was moved to 634 Hospital Trust Building, Providence, R. I. Ralph B. Robitaille will be in charge of the office and will handle sales of "Philprene" synthetic rubbers and "Philblack" carbon blacks.

Standard One-Piece Rims

According to Raymond C. Firestone, executive vice-president of the Firestone Tire & Rubber Co., Akron, Ohio, new one-piece rims and tubeless tires, both developed by Firestone, will be standard equipment on 1956 model trucks. Mr. Firestone announced the acceptance by major motor truck manufacturers of his company's new tubeless tire and drop center rim assembly. The program developed by Firestone will become standard throughout the rubber industry, he said. Firestone factories already are mass-producing the new tires and rims for the original equipment and replacement markets. With the new assemblies, truckers will gain the advantages of tubeless tire construction. In addition, tubeless truck tires and one-piece drop-center rims are considerably lighter than multi-piece rims and tubed tires that long have been standard in the trucking industry. Within a short time, the tubeless tire mounted on a drop-center rim is destined to be used on virtually all over-the-highway trucks of types that have used multi-piece rims and tubed tires, Mr. Firestone predicted. The Firestone tubeless truck tires and one-piece rim are being manufactured in new size designations up through the replacement for 11.00-20 and 11.00-22. They will be used on more than 90% of heavy over-the-road trucks, the company states.

Poly-Cone 1000 Mold Cleaner

National Polychemicals, Inc., Wilmington, Mass., has announced "Poly-Cone 1000", a new modified silicone emulsion, designed specifically to minimize costly rubber mold cleaning operations. In addition, the new emulsion provides efficient mold release and imparts a high quality finish to the surface of molded products. Extensive factory trials have indicated that Poly-Cone 1000 will substantially lengthen the period between mold cleaning operations. It is effective on conventional metals used for molds, including aluminum, which ordinarily presents a difficult problem, the company states. Because of its ability to keep molds clean over long periods of use, Poly-Cone 1000 is particularly suited for white and light colored goods where the effects of mold contamination are more clearly noticeable. Poly-Cone 1000 contains 38% active ingredients, the larger proportion of which is a silicone oil.

Borden Licenses Colombian Firm

The Chemical Division of the Borden Co., New York, N. Y., has licensed General de Productos Quimicos Fadales, S.A., to manufacture "Polyco" synthetic resin emulsions in Colombia. A polymerization unit was recently shipped to the Colombian concern by the Chemicals Export Co. This latter company manages export sales activities for the Polyco Department of the Borden Chemical Division. This will be the first polymerization plant in Colombia. The Chemical Export Co. states that the establishment of polymerization production facilities in Colombia brings to nine the number of foreign countries in which Polyco emulsions are produced.

Los Angeles News

Practical instruction in the manufacture, sale, and chemistry of rubber products will again be made available to people working in the rubber industry during the coming scholastic year at the University of Southern California under the sponsorship of the Los Angeles Rubber Group, Inc. For the past several years, this course has made an outstanding contribution to and has been enthusiastically received by production, sales, administrative and new technical personnel in and associated with the rubber industries.

During the past year, the course proved of special value when the rubber laboratory facilities at U.S.C. were made available to the class to demonstrate the use of manufacturing and testing equipment. The rubber laboratory at U.S.C. is one of the most modern and complete in the country and is a joint project of the TLARGI Foundation and the University of Southern California. Basic Rubber Technology is a non-credit course.

Among the subjects covered in the lectures and laboratory sessions, will be compounding, processing, new types of synthetic rubbers, mold design, costing, production control, rubberized fabrics, rubber equipment and testing. Features of the course are visits to rubber plants in the area and discussions in the classroom led by some of the world's leading rubber technicians.

The first meeting of the class was scheduled for Thursday evening, September 15, 7:00 to 10:00 P.M., Room 104 Bacteriology Building, U.S.C. Classes will be held each Thursday for fourteen weeks. The registration fee is $15.00. Registration was accomplished simply by attending the first meeting of the class. The classes are being conducted by Laurence E. Peterson, rubber chemist and supervisor of industrial products compounding for the Goodyear Tire & Rubber Co.

Frank J. Holmes, formerly assistant factory manager of the Armstrong Tire & Rubber Co., Natchez, Miss., has been appointed factory manager of the sporting goods operation of the W. J. Voit Rubber Corp., Los Angeles, Calif. In his new position, Mr. Holmes will be responsible for production, quality control, personnel, laboratory, development, engineering and maintenance functions.

For 17 years, Mr. Holmes was with the Goodyear Tire & Rubber Co. in Akron, Ohio and Norrkoping, Sweden. While in Sweden, with the Goodyear Gummi Fabriks, Mr. Holmes held the positions of chief chemist and development manager. For the past four years he served in the joint posts of technical director and assistant factory manager at Armstrong Tire & Rubber Co. Mr. Holmes is a member of the American Chemical Society, the Akron Rubber Group and the Swedish Rubber Technology Institution. He received his education at Worcester Polytechnic Institute, the University of Akron and the University of Cincinnati.

Witco Chemical Co., with offices in the Los Angeles and San Francisco, areas, has been selected to serve as technical sales representatives for the Emulsol Chemical Corp., Chicago, Ill., in the California area, for its surfactants used in the industrial cleaning, sanitizing, petroleum, and sanitation specialties fields. The W. G. Wunderly Co., Pasadena, Calif. and the F. M. Speekman Co., San Francisco, will provide Emulsol technical sales and service in southern and northern California, respectively, in the agrichemical, food, cosmetics, and mining industries.

Carlisle Corp., Carlisle, Penna., has purchased the Stoner Rubber Co. of Anaheim, Calif., and current plans call for an expansion of production at the latter company. N. S. Von Rohr, former president of Stoner Rubber, will remain as general manager under the new management.

Atlas Sponge Rubber Co., formerly located at 806 East 61st St. in Los Angeles, has moved to new and larger quarters at 1707 S. California Avenue, Monrovia, Calif. Roy N. Phelan, owner and general manager of the company, states that the new plant offers larger manufacturing facilities and efficient shipping and receiving departments.

Charles F. Ashcroft has been transferred from managing the San Francisco office of the B. E. Dougherty Co. to the Los Angeles area, where he is now covering the rubber industry.

Witco Opens New Sales Office

Witco Chemical Co. and the Continental Carbon Co., both of New York, N. Y., have announced the opening of a new sales office and technical service laboratory at 213 West Bowery St., Akron 8, Ohio. Modern and complete technical service facilities, together with the Akron and Cleveland sales offices, have been established at the new address. In this location, Witco-Continental aims to attain new highs in the promptness and efficiency of their technical service to the rubber industry.

New Tire Plant for Philippines

The Export Import Bank has announced the authorization of a $1,800,000 credit to the Goodrich International Rubber Co. of Manila for the construction of a tire plant. The credit is to assist the company in financing the purchase of United States materials, equipment and services for the plant. It will be located near Manila.

Rhode Island Educational Program

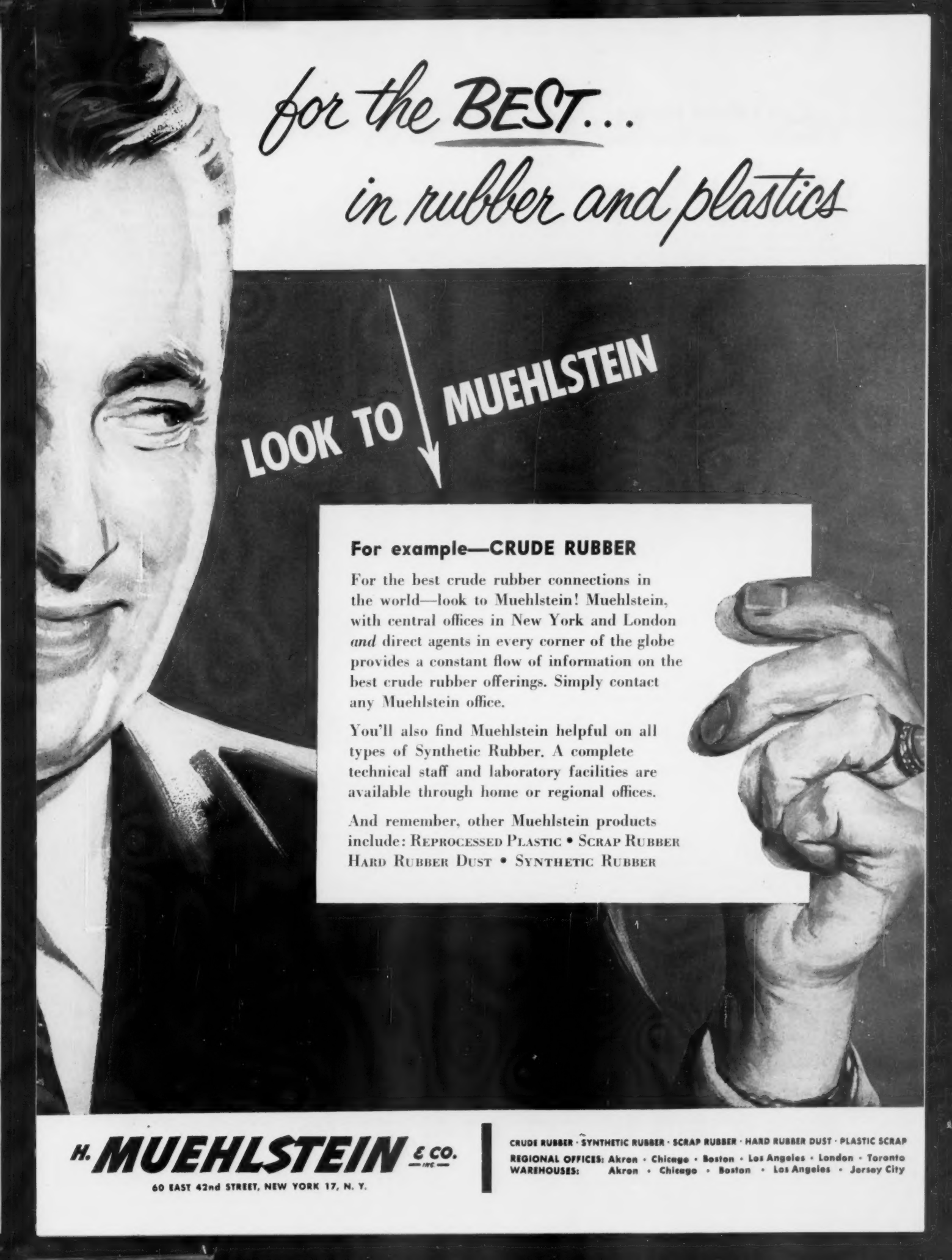
The Rhode Island Rubber Club has announced completion of arrangements for a rubber chemistry course on a somewhat advanced level which will be of interest to practicing rubber chemists. Such a course is now to be given, under sponsorship of the Rhode Island Rubber Club, in the fall semester of the Extension Division of the University of Rhode Island. As presently planned, the course will start on September 21 at the College of Education Building, University of Rhode Island, 25 Park St., Providence, R. I. The course will consist of fifteen classes, each of two hours duration, on Wednesday of each week. Classes will start at 7:00 P.M. The tuition fee for the complete course will be $20.00. The instructor will be Robert C. Kohrn, supervisor of new product development at the Providence plant of the U. S. Rubber Co. The course will open with a review of organic chemistry nomenclature, structural formulas, polymerization, and other pertinent reactions. The chemical structure, preparation, vulcanization and properties of natural rubber, GR-S type rubber, neoprene, nitrile, Butyl, polyurethane, and other elastomers will be discussed. The chemical nature of a number of plastics will be described. While a background of college chemistry would be valuable to applicants, this is not essential, since about three hours will be spent reviewing the basic chemistry involved. Those interested in the course should contact: University of Rhode Island, Division of University Extension, 25 Park St., Providence 8, R. I.

New West Coast Representative

William Blalock has been named technical representative for stearates for the Witco Chemical Co., New York, N. Y. Mr. Blalock will operate only in Witco's West Coast region and will have responsibilities involving plant operation, stearate research and technical sales. Mr. Blalock joins Witco after ten years of experience in the field of metallic stearates. A graduate of the University of Indiana, he received his M.S. degree in chemistry from the University of Southern California. Subsequently, he served as a chemistry teacher in Petaluna High School, Petaluna, Calif., in the military service, and with the Lefingwell Chemical Co.

Increasing Plant Capacity

Announcement has been made by Michigan Chemical Corp., Saint Louis, Mich., of a program to enlarge considerably the capacity of its magnesia plant at Saint Louis. Besides increasing volume the plant additions will provide ways and means of adding product types which will permit diversification of its magnesium oxides into wider markets. Starting with high-purity, Michigan natural brines, Michigan Chemical has been an important supplier of magnesia compounds for many years to users in many industries. These include processors in rubber, insulation, building board, chemical, drug, and ore refining.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Canadian News

National Lead Co., through its subsidiary, Canadian Titanium Pigments, Ltd., will construct Canada's first titanium pigment plant on a site near Varennes, Province of Quebec, on the south bank of the St. Lawrence River about fifteen miles northeast of Montreal. The new plant is designed to meet Canada's entire requirements for titanium oxide and will cost approximately fifteen million dollars.

Titanium pigments are used extensively by the rubber, paint, plastics, paper and other industries to add whiteness, brightness and opacity to their products. Since titanium pigments were first introduced into Canada by Canadian Titanium Pigments, Ltd. in 1927, the demand for them has increased steadily each year and Canadian manufacturers have used increasing quantities, imported chiefly from the United States.

National Lead has extensive operations in Canada. In addition to Canadian Titanium Pigments, Ltd., there are four other subsidiaries with factories and offices throughout Canada. The Canada Metal Co., Ltd. manufactures lead, brass, zinc, aluminum and other nonferrous metal products in Calgary, Montreal, Toronto, Winnipeg and Vancouver. Barber Die Casting Co., Ltd. of Hamilton, Ontario, and Lake Shore Die Casting, Ltd. of Toronto manufacture die castings for the automobile, electrical appliance and hardware industries. Baroid of Canada, Ltd., with offices in Calgary, Alberta, supplies the oil fields of Western Canada with oil well drilling mud materials and oil logging services.

The new titanium pigment plant will require approximately 750 workers at the peak of construction which will be reached in the fall of 1956. Production is expected to begin in 1957 and the plant will give employment to about 400 people.

Contract for the construction of a $300,000 warehouse and office building at London, Ont., for Goodyear Tire & Rubber Co. of Canada Ltd., has been let to Con-Eng. Contractors Ltd. of London, it was recently announced. The contract calls for a 17,000 - square - foot one - story building. The warehouse will include office quarters. Construction will start immediately, the construction company officials said.

A. E. Ruthven, manager of the G P Footwear Division of United Rubber, Ltd., has announced the appointment of J. A. Baine as Ontario District sales manager. Mr. Baine has had 25 years experience in the rubber footwear industry, most of this period being spent as sales representative of Gutta Percha & Rubber, Ltd. in Western Ontario.

Bruce F. Smith, manager of technical service in the International Department of the Dow Corning Corp. has been transferred to the company's Canadian affiliate, Dow Corning Silicones, Ltd., of Toronto. Mr. Smith assumed his duties on September 1 as manager of the Canadian company's newly established branch office in Montreal. The move was being made to extend and improve the affiliated company's service to users of silicones in the important industrial area centered in Montreal.

Mr. Smith is already well known to many in the trade as he has specialized on the problems of Canadian customers since the incorporation of Dow Corning Silicones two years ago. Mr. Smith also brings to his new job the general experience of four years in Dow Corning's export sales service and two years in its Product Engineering Laboratories. A 1949 graduate of Michigan State University, Mr. Smith holds a B.S. degree in chemistry.

A powerful and completely non-staining antioxidant for use in the manufacture of rubber goods has been introduced in Canada by the Chemicals Division of Canadian Industries (1954) Ltd. Known as "Nonox" WSL, this new product is expected to be of particular value to rubber manufacturers wherever an absolute minimum of discoloration is required, notably whitewall tires and electrical insulation rubbers. The product is also helpful in improving the appearance and quality of white and colored rubber footwear, flooring compositions, and most goods produced from latex compounds.

In the past, the general tendency for potency to be assocated with staining has severely restricted the number of antioxidants available to the rubber technologist concerned with producing light-color goods. Non-discoloring or substantially non-discoloring results have usually been achieved at the expense of an important degree of protection against aging, the company states. Results, after prolonged tests with vulcanized rubber containing "Nonox" WSL under temperate and sub-tropical conditions, showed a complete absence of staining and a retention of tensile strength after accelerated aging.

Construction will soon begin on an extensive new research and control laboratory planned by the Dow Chemical Co. of Canada at its plant in Sarnia, Ont. The new laboratory, to be located near the main gate of the plant, will contain 15,000 square feet of floor space, with facilities for both research and control laboratory use.

The main floor will contain offices, laboratories and washrooms, together with general service areas—shipping, receiving and storage. The second floor, which will cover only about one-third of the main floor, will provide a conference room, library and lunch room. Also on this floor, will be the mechanical room, where heating and ventilating equipment will be installed. With the future in mind, the building has been designed for two-way expansion, and will eventually become a full two-story U-shaped building.

Viceroy Manufacturing Co., Ltd., has announced a $1,500,000 program of expansion and refinancing. The Toronto firm has just completed the sale of $500,000 first mortgage 3½% serial bonds, maturing 1 to 10 years, and $1,000,000 first mortgage 4½% sinking fund bonds maturing in 20 years, to Harris & Partners, Ltd., and J. F. M. Stewart & Co., Ltd. Major purpose of the refinancing program is to underwrite a broad expansion and diversification plan, company officials stated.

Under the expansion program, the company will improve its main Toronto plant, which is headquarters for its Rubber Division. A second plant will be used to manufacture latex and vinyl products, and a third has been purchased for Viceroy's Engineering Division and other purposes. A new modern power plant will also be built south of the main Toronto plant.

Oliver Acquires Dural Rubber

Oliver Tire & Rubber Co., Oakland, Calif., has acquired controlling interest in the Dural Rubber Co. of Flemington, N. J. The newly-elected officers of Dural Rubber are: G. F. Oliver, president; J. J. Davidson, vice-president; William C. Draper, Jr., secretary-treasurer, and E. D. Wooldridge, assistant secretary-treasurer. The new board of directors consists of the four officers and F. H. Pennock. Mr. Oliver stated that Dural Rubber would continue its present line of production and its services to existing customers. Likewise, it will maintain its key personnel and labor force of 250 persons. Acquisition of Dural Rubber by Oliver Tire is expected to strengthen the financial, technological and managerial structure of both companies. Mr. Pennock, one of the new directors of Dural Rubber, is manager of Oliver Tire's Industrial Rubber Products Division. Mr. Davidson will serve as resident manager of Dural Rubber and Mr. Wooldridge will serve as sales manager.

Hull Elected MCA President

General John E. Hull, U.S.A. (Ret.) former United States and UN commander-in-chief of the Far East, has been elected president of the Manufacturing Chemists' Association, Inc., Washington, D.C. General Hull succeeds William C. Foster, who resigned effective July 31. After 37 years' service, General Hull retired from the Army on April 30, 1955. For the past two months he has served as vice-chairman of a Defense Department committee to study the problem of American Prisoners of War captured in Korea. The Manufacturing Chemists' Association was organized in 1872. Made up of companies engaged in the actual production of chemicals, its members represent more than 90% of the production of such products in America.

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Obituaries

Frank A. Seiberling

Frank Augustus Seiberling, a dean of the American rubber industry and founder of two major rubber companies, died on August 11 in Akron General Hospital, Akron, Ohio. He was 95 years old and had been in ill health since his retirement five years ago as chairman of the board of the Seiberling Rubber Co. Mr. Seiberling was born on a farm at Western Star, Ohio, less than five miles from the present Seiberling Rubber Co.

factories, on October 6, 1859. His father, a successful inventor, was a manufacturer of agricultural machinery and a pioneer Akron businessman. Frank A. Seiberling studied at Heidelberg College for two years and then began his industrial career with his father's farm machinery company.

The Panic of 1893 brought collapse of the J. F. Seiberling Co. along with many other businesses. At the age of 39 and with a wife and three children, Frank Seiberling was out of a job. He borrowed $3,500 for a down payment on the idle buildings and property of the old Akron Strawboard Co., and with his brother, the late C. W. Seiberling, founded the Goodyear Tire & Rubber Co. Under his guidance the new venture, named for Dr. Charles Goodyear, inventor of vulcanization, emerged eighteen years later as the world's largest tire manufacturer.

Loses Control of Goodyear

The company's sales soared to more than $200,000,000 in 1920, the year before Mr. Seiberling lost control in a financial panic which found Goodyear with huge inventories and rapidly dropping prices. Once more, Mr. Seiberling, then almost 62 years old, was out of business, this time with obligations of $6,500,000. How, seven years later, he was able to pay off his creditors in cash with interest, remains a saga of the financial world today.

Since both Frank Seiberling and his brother were beyond the age when they could expect to find new jobs, they decided their best chance for recovery was in the business they knew best—rubber. On November 16, 1921, they founded the Seiberling Rubber Co., taking over the idle property of the old Portage Rubber Co. in Barberton, Ohio, and the Lehigh Tire and Rubber Co. in New Castle, Penna., for a new start in the rubber business. Their new company was near the bottom of the more than 300 rubber manufacturing firms in the nation at that time.

Mr. Seiberling's determination to succeed enabled his new company to weather depressions and set-backs during the Twenties and Thirties and take its place as one of the nation's leading rubber companies. He served as president of Seiberling Rubber until 1938, and remained at his desk as chairman of the board of directors until 1950 when he retired at the age of 90. He was succeeded in the presidency and as chairman of the board by his son, James Penfield Seiberling.

Known as "Little Napoleon"

Mr. Seiberling was known as the "Little Napoleon" of the rubber business because of his small stature and determination to succeed. During his career, he played a leading part in developing the city of Akron from a small town to the rubber center of the world. In the rubber industry, he invented the first tire building machine and introduced the first straight-side tire and quick detachable rim. He also introduced the modern small cord tire which replaced the old fabric type.

Mr. Seiberling founded Goodyear Heights, a prominent residential section of Akron, and Fairlawn Heights, another residential district in Akron. He was a founder of the Lincoln Highway Association and served as president of the association in its early years of existence. Mr. Seiberling was largely responsible for America's lighter-than-air craft industry, bringing the German Zeppelin interest to this country in behalf of Goodyear. This country's first dirigible, the "Akron", was built in 1910 under his sponsorship.

His faith in pneumatic tires for heavy duty vehicles led him to establish a bus line between downtown Akron and Goodyear Heights and to launch the nation's first long distance truck line between Akron and Boston, Mass., in 1916. Akron's Seiberling Field, an athletic plant equal to many of the nation's colleges, was built through his efforts and Seiberling Gymnasium, dedicated at Heidelberg College, Tiffin, Ohio, in 1951, was made possible by his financial support and leadership.

He was recognized as the father of Akron's Metropolitan Park System and founded the Akron Institute for the Blind, the Akron Settlement Association and various homes for the aged. He was co-sponsor of the University of Akron's library building. Mr. Seiberling was an early president of the Akron Chamber of Commerce and a former director of the United States Chamber of Commerce; past-president of the board of trustees of Lincoln Memorial University, Harrogate, Tenn., and a former trustee of Heidelberg College; Buchtel College (now Akron University); Western Reserve Academy, and Akron Peoples Hospital.

He was awarded honorary doctors degrees by Lincoln Memorial University, Heidelberg College and the University of Akron. He established the Goodyear Flying Squadron to train employees, and the Goodyear Industrial University. In 1916, Mr. Seiberling instituted Goodyear's first pension plan. He was a member of the City, University and Portage Country Clubs in addition to many social and civic groups.

Mr. Seiberling and his wife, who died in 1946, were parents of James Penfield Seiberling, presently president and chairman of the board of Seiberling Rubber; Willard P. Seiberling, company secretary; Frank A., Jr., professor in the College of Fine Arts at Ohio State University, and two daughters, Mrs. Irene Harrison of Akron, and Mrs. Virginia Handy of New York City.

F. Ray Campbell

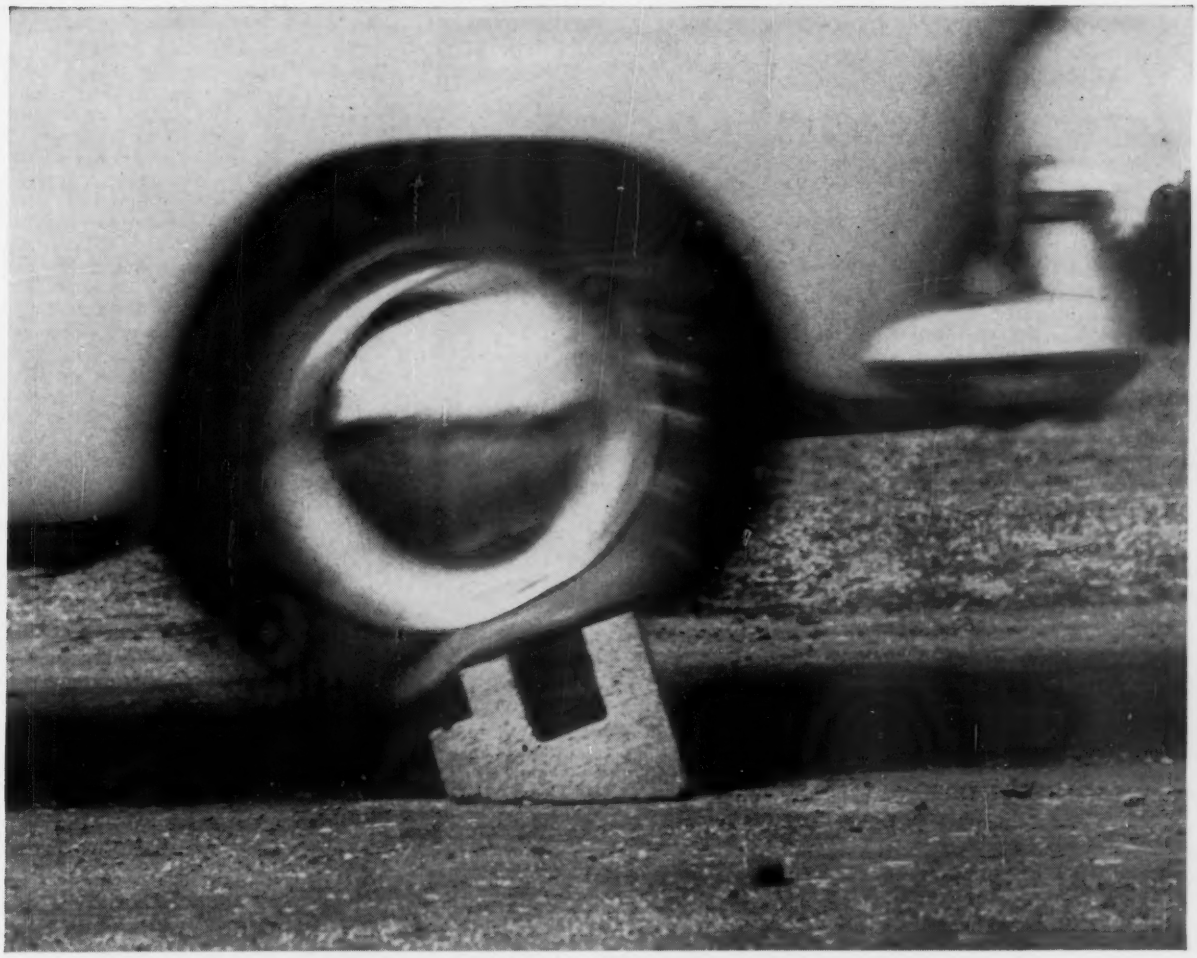
F. Ray Campbell, retired Washington, D. C., district manager of the B. F. Goodrich Co., died on August 19. Mr. Campbell was widely known in eastern sales circles. His father, William C. Campbell, was Goodrich tire and equipment district manager at Pittsburgh, Penna. F. Ray Campbell had been associated with Goodrich for more than thirty years. Before going to Washington in 1943, he was district manager at Baltimore, Md. Born in Williamsport, Penna., he attended Penn State University.

Herbert Horsfall

Herbert Horsfall, for many years president and chairman of the board of the Canada Wire & Cable Co., died on August 20 in Toronto, Ont., Canada. He was 76 years old. Mr. Horsfall had also been president and managing director of Allied Brass, Ltd.; president of the Leaside Housing Co., Ltd.,; vice-president of the Lake St. John Power and Paper Co., Ltd., and a director of many other companies. He is survived by his wife.

Walter A. Schumacher

Walter A. Schumacher, purchasing agent of the Textileather Division of the General Tire & Rubber Co., died on August 9 in Toledo, Ohio. He would have been 74 years old on August 11. Mr. Schumacher had been in the textile, carpet and chemical business in the New York metropolitan area for twenty-five years before joining Textileather twenty-nine years ago. He is survived by his wife.



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Foam Rubber Prices Raised

Several major manufacturers of foam rubber products have announced price increases on their products. Generally, the price increases were attributed to the rising cost of natural rubber latex, recent price increases in synthetic latex, and other material costs. Firestone Tire & Rubber Co. announced increases of 5 to 10% on its foam rubber prices effective August 8. On all furniture and bedding items and pillows, which are made primarily from natural latex, prices were increased by 10%. On all sheet stock and foam rubber slabs, which use larger proportions of synthetic rubber, the prices were increased 5%. Goodyear Tire & Rubber Co. also announced price increases effective August 11. All "Airfoam" slab products, including the shoe cushioning material, "Airfoot", have been increased 5%. Prices on other Airfoam products, including furniture, transportation and utility items, have been increased 10%. The Koolfoam Division of the Dayton Rubber Co. has announced price increases averaging $1.00 in the retail price at which its foam rubber pillows are sold. The new Dayton Rubber prices are effective as of August 29.

Rudolph Zinsser

Rudolph Zinsser, vice-president of William Zinsser & Co., Inc., New York, N. Y., died on August 14 at his home in Kings Point, L. I., N. Y. He was 65 years old. Born in New York, he attended private schools and was graduated from Princeton University in 1910. He received his master's degree in chemistry from Columbia University in 1911. Upon graduation, he joined William Zinsser & Co., which had been founded by his grandfather in 1849. The Zinsser company is known as the oldest shellac manufacturer in the United States. Mr. Zinsser was active in the management and expansion of the company until his death. He had made his home in Kings Point for thirty years. He was elected mayor of the community in 1952 and served in that capacity until his death. He is survived by his wife, a son and a daughter.

Re: Haslam Obituary

Some additional details have been made available regarding the life and career of George S. Haslam who died on January 5. An obituary on Mr. Haslam appeared in the August, 1955, issue of RUBBER AGE. At the time of his death, he was chief of products application in the Research Department of the New Jersey Zinc Co. (of Pa.) at Palmerton, Penna. Mr. Haslam was a graduate of Rhode Island State College and was a member of Phi Kappa Phi, national honorary science fraternity. He held membership in the American Chemical Society and the American Society for Testing Materials. Mr. Haslam saw military service during World War I and had been active in American Legion affairs. During World War II, he served on the War Production Board in Washington, D. C.

Private Nuclear Reactor

U. S. Rubber Co., New York, N. Y., is one of eight of the nation's leading industrial companies which plan to build and operate in the New York area the first nuclear reactor to be owned and operated by private industry for research in industrial and humanitarian fields. The plan was recently announced by General Walter Bedell Smith, chairman of the board and president of AMF Atomics, Inc., a subsidiary of the American Machine & Foundry Co. AMF Atomics will build the reactor. Other companies participating in the formulation of the plans include the American Tobacco Co., Continental Can Co., Corning Glass Works, International Nickel Co., Chas. Pfizer & Co., Socony Mobil Oil Co., and U. S. Rubber. Other companies are expected to announce their participation shortly. The Industrial Reactor Laboratories, as the facility will be called, will be located on a 250-acre tract within commuting distance of New York. Options have already been taken on two sites in New Jersey and New York within 50 miles of New York City. It will cost between $1,500,000 and $2,000,000.

Harshaw Stock Split Proposed

Directors of the Harshaw Chemical Co., Cleveland, Ohio, recently proposed a two-for-one split in the company's common stock. Stockholders will vote on the plan at the next annual meeting in January. Authorized stock would be increased to 1,500,000 from 600,000 shares. Upon stockholder approval management will apply to list the shares on the New York Stock Exchange, W. J. Harshaw, president, stated. The regular 40-cent cash quarterly on common was declared, payable September 13.

Discontinues Cord Set Production

The Hatfield Wire and Cable Division of Continental Copper & Steel Industries, Inc., which maintains headquarters at Hillside, N. J., has discontinued operations in its cord set factory at East Newark, N. J. It is understood that the equipment from the East Newark plant may be sold shortly to another rubber concern. Some of the personnel from the cord set plant have been transferred to the Hillside plant while others have been let out.

ASME Plans Annual Meeting

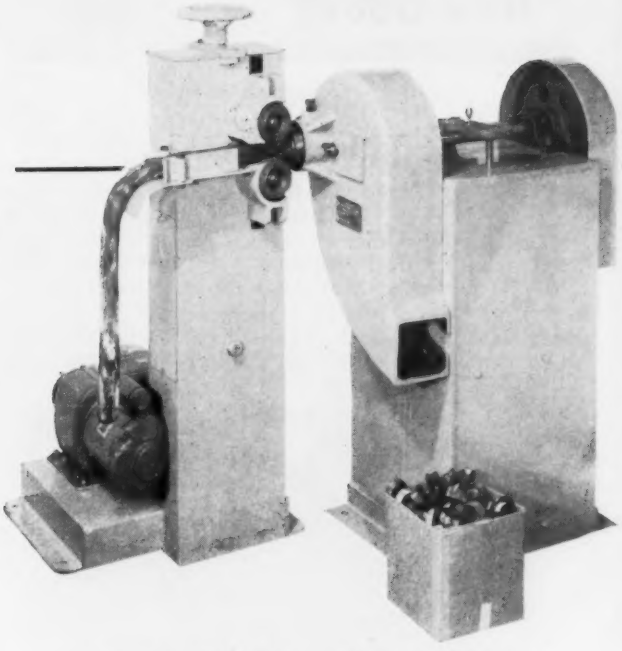
The American Society of Mechanical Engineers' Diamond Jubilee Annual Meeting will be held this year in Chicago, Ill., at the Congress, Conrad Hilton and Sheraton-Blackstone Hotels from November 13 to 18. Special features commemorating ASME's 75th anniversary have been planned for the six-day event. ASME conferees will hear and discuss more than 300 technical papers at 110 sessions covering a variety of subjects, including rubber and plastics. The Chicago Section of ASME will be hosts to their fellow society members and have arranged an interesting and diversified program of events for them. Sidelighting the 75th anniversary celebration will be the "Exposition of Power and Mechanical Engineering" at the Chicago Coliseum from November 14 to 18. Under the auspices of ASME, the exposition will feature displays showing the newest developments in equipment power generation and distribution, automatic control, mechanical power transmission and utilization and maintenance and production equipment designed to lower operating costs and reduce maintenance. A new timely section on atomic power will also be featured.

General Tire Gets German Link

General Tire & Rubber Co., Akron, Ohio, has announced the completion of a long term technical service contract with Metzeler Gummiwerke A.-G. of Munich, Germany. C. F. O'Neil, vice-president in charge of foreign operations, said the relationship is not merely confined to the field of technical know-how. It also envisions an expanded policy of close cooperation in every phase of industrial and commercial development. The agreement marks the sixth manufacturing affiliation on the European continent for General Tire. The others are with companies in The Netherlands, Portugal, Spain, Italy and Switzerland. General also operates plants in Canada, Mexico, Venezuela, Brazil, Chile, South Africa and Israel. Metzeler Rubber Works has about 2,000 employees and operates plants in Munich and Memmingen, Bavaria. Established in 1871, Metzeler produces not only tires, tubes and latex products, but also an extensive line of surgical rubber goods, floor covering, molded goods, waterproofing materials and sports goods.

Norman C. Hill

Norman C. Hill, vice-president of the C. P. Hall Co., Akron, Ohio, died on August 12 at City Hospital in Akron. He was 62 years old. Mr Hill was formerly chief chemist of the government's rubber laboratories at the University of Akron. In 1949, he was chosen chairman of the Division of Chemical Literature of the American Chemical Society. Mr. Hill was a member of the Carnegie Clan in Akron, alumni of Carnegie University. He also was a graduate of the Massachusetts Institute of Technology. Mr. Hill was a member of the American Institute of Chemical Engineers, the Akron City Club and the Chemists' Club of New York. He is survived by his wife, three daughters and his son.



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This versatile unit was recently observed in production at the plant of a large Eastern rubber manufacturer.

In one 8-hour shift, the machine cut 14,000 pounds of extruded stock !

Such capacity spells out production economies rarely found in rubber slug cutters.

Write for specification data sheet.

G. F. GOODMAN & SON

401 RICHMOND STREET, PHILADELPHIA 25, PA.

Machinery for the Rubber Industry

---

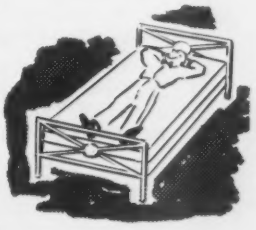
consider this foam rubber mattress... a good product

BUT ITS SALES WERE DOWN ! ! !

because of its unpleasant odor

Then its maker discovered that ALAMASK® reodorants mask and modify the obnoxious odor of rubber itself and of the various chemicals used in processing the end product. Buyer resistance was quickly overcome.

Wise rubber goods manufacturers recognize that offensive odors adversely affect sales. ALAMASK reodorants solve the malodor problem, at very little cost, without influencing processing characteristics or rate of cure.



No matter what your rubber product, make it odor-free with ALAMASK, and *watch sales climb.*

ALAMASK reodorants are also effective in controlling malodors caused by stack fumes and plant effluents and can improve olfactory conditions both within and outside your plant.

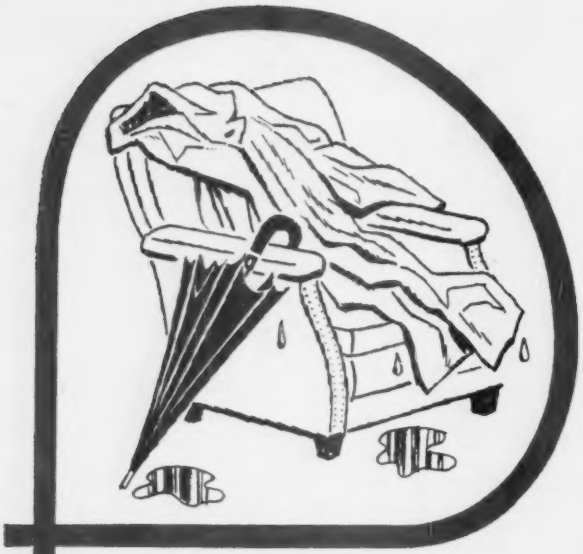
"ALAMASK" TYPE RECOMMENDED	Latex				Dry Rubber				Elasto-Plastics		
	Foam	Sponge	Dipped Goods	Bonded Fibers	Adhesives	Natural	Synthetic	Reclaim	Chemically Blown	Polyvinyl	Polyaryl	Plastisols
AA										X	X	X
AF					X		X		X			
AO or AO-X					X	X	X		X			
AR or AR-F			X		X							
BF or BG-X	X	X	X		X	X	X					
BGM or BGM-X	X	X		X		X						
CY					X				X			
DJ	X	X	X				X		X			
DL							X		X			
H			X		X			X	X	X	X	
LD	X	X	X	X	X	X		X				
ND or ND-X	X	X	X	X	X	X	X	X	X	X	X	
O	X	X	X	X		X	X		X	X	X	X
OS or OS-X	X	X	X	X			X					

For use in latex, the water-dispersible "ALAMASK" form is recommended. The water-dispersible forms are designated by "-X" or "-F" following the "ALAMASK" type name.

For complete information on how ALAMASK can lick your rubber malodor problem, write today to Industrial Reodorants Division ("Alamask"), Rhodia, Inc., 230 Park Avenue, New York 17, N. Y.

Rhodia INC.

Canadian Representatives:
Naugatuck Chemical Division
Dominion Rubber, Ltd.



GREATER ECONOMY IN VINYL FILM LAMINATING INTEREST YOU?

ARCCO C 510 Heat Seal Solution Laminant offers these advantages over direct calendering:

Spreader knife application of base coat, any time prior to lamination, simplifying production schedules.

Lamination and embossing accomplished in one pass, an important processing economy.

Small orders easily processed without upsetting calender schedules.

Laminating with ARCCO C 510 eliminates necessity of making up small lots of coating compound.

Non-reclaimable scrap vinyl compound eliminated.

Greater versatility. Fabric base coated with ARCCO C 510 can be laminated to vinyl film ranging from .004" gauge to .020".

Other ARCCO Heat Seal Solutions and Emulsions provide excellent adhesion to cotton, wool, rayon and leather, and can be tailor-made to meet your individual requirements.

An ARCCO engineer will be glad to call and give you complete information about the characteristics and uses of ARCCO C 510 Heat Seal Solutions and Emulsions for vinyl films and as Heat Seal Coatings for fabrics.

ARCCO offers a complete compounding service for emulsions, solutions and hot melts, both standard and specialized formulae. Feel free to consult our ARCCO Technical Service about your specific requirements.

ARCC

AMERICAN RESINOUS CHEMICALS CORPORATION

RESIN EMULSIONS, SOLUTIONS AND HOT MELTS FOR ADHESIVE BASES, BINDERS, COATINGS, SIZES AND SATURANTS

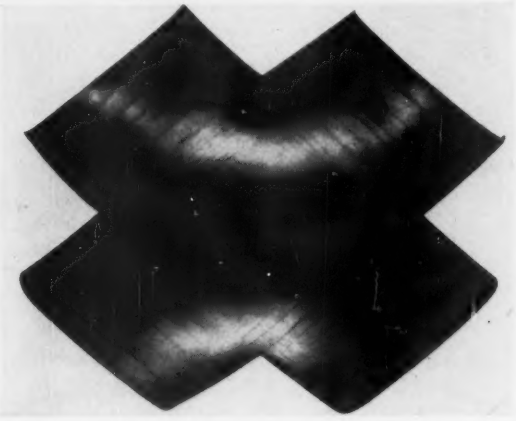
GENERAL OFFICES: *103 FOSTER STREET, PEABODY, MASSACHUSETTS*

IN CANADA: American Resinous Chemicals of Canada, Ltd., 20 Trent Ave., Toronto, Canada

New Goods

Voit Nylon Flexmaster

W. J. Voit Rubber Corp., 1600 East 25th St., Los Angeles 54, Calif., has added an improved nylon tire repair unit for vehicles ranging from passenger cars to heavy off-the-road equipment to its "Voit Flexmaster" series of tire repair materials. The new nylon section repair patch is substantially lighter than the original rayon Flexmaster patch. The unit retains the structure of its rayon predecessor and adds to it the strength and



flexibility characteristic of nylon. Available in uncured form (the rayon Flexmaster is available in both cured and uncured forms), the nylon Flexmaster's all natural rubber, high-grade cushion stock assures a safe, lasting bond, while the extra-high-tensile nylon gives maximum strength with minimum weight. The cross direction flexibility provides easy installation and greater absorption of road shock and vibration. The Voit Flexmaster has been engineered to an 82 degree angle which conforms more closely with new passenger car and truck tire construction. The top ply has been strengthened through longer ply length, but the convenient longer tie-in feature has not been extended into the bead area.

Dayton Oxygen Hose

A new oxygen hose that carries radio communication wire on the outside will provide greater safety for jet fighter pilots flying at supersonic speeds, according to the Dayton Rubber Co., Dayton, Ohio. The new hose eliminates possible danger of sparks from the wire igniting the oxygen. It also minimizes the danger of the pilot becoming entangled in the wire in an emergency bail out. Now the pilot can unplug the radio wire quickly, just as he would unplug a radio in his home. Or, if he doesn't have the time, the wire plugs will pull lose easily when the pilot "ejects" himself from the cockpit.

The wire, insulated in plastic, runs down the "screw" outside the new oxygen hose. This also makes it easier for maintenance men to see and repair breaks in the wire, Dayton Rubber states. The new design is simpler and far less costly to produce. Formerly, the wire was molded inside the hose, an expensive and time-consuming process. And when there was a break in the old wire, the entire hose had to be thrown away.

Voit Flexible Radiator Hose

An improved line of machine-molded flexible radiator hose designed expressly to meet the needs of today's modern power plants has been developed by the W. J. Voit Rubber Corp., 1600 East 25th St., Los Angeles 54, Calif. The new product is an advanced version of the flexible radiator hose Voit first introduced in 1951 and is featured by its all-neoprene construction. The new product will be

manufactured in the company's newly-completed plant at Danville, Ill. Voit states that neoprene was chosen because of its proved resistance to heat, abrasion, soluble oils, radiator additives and cooling system chemicals, as well as its ability to provide maximum protection against sharp metal parts. As an additional safeguard, Voit has used "Hypalon" coating inside and out to assure against aging and weather-checking. In addition to its all-neoprene construction and its Hypalon coating, the new Voit hose offers integrally molded tempered steel springs and machine-insured length tolerances. The machines eliminate the human factor and insure that each type and length of hose is identical.

Bayshore "Bend-Me" Toys

Bayshore Industries, Elkton, Md., has announced the addition of the Disney characters "Bambi" and "Tramp Dog" to its current line of "Bend-Me" toys. Made of foam rubber, with wire inserts, both toys join the present Disney characters in the line, which consists of "Pluto," "Donald Duck," "Mickey Mouse" and "Pinocchio." Softly colored, carefully detailed, the new items appear to round out a group currently in demand. "Bambi" stands approximately 11-inches high, while "Tramp Dog" stands approximately 7-inches high. "Bambi" is available in a colorful box, while "Tramp Dog" can be bought two ways — either in printed cellophane or in gaily printed tray.

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CARTER BELL PRODUCTS
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REDUCES CURING TIME

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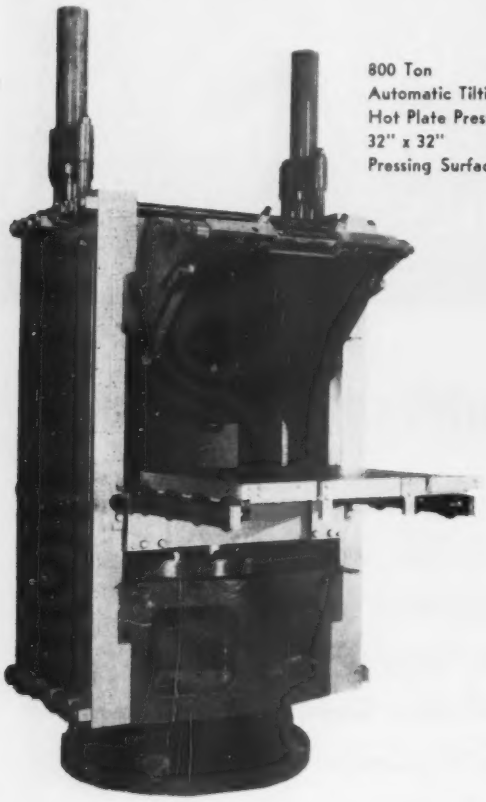

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All the advantages of rigidity and accuracy of our *SIDE PLATE* presses—with an added feature: Hot Plates which automatically roll forward, making the molds easily accessible to the operator. Long life and low maintenance cost because no part of this mechanism is subjected to the pressure developed by the press. The basic press is the same—

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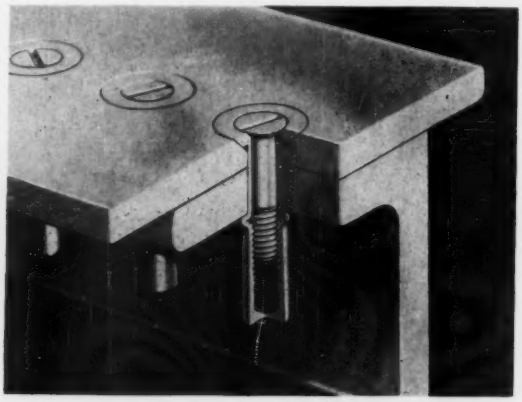
(HYDRAULIC PRESS DIVISION)
1022 GREENE ST. PIQUA, OHIO

Goodrich Aircraft Rivnut

A new type of "Rivnut", a one-piece blind rivet approved for primary aircraft structures, has been introduced by the B. F. Goodrich Co., Akron, Ohio. Working with aircraft engineers, Goodrich developed this special new aviation Rivnut called the "Seal-Head" with a rubber O-ring. In application, a Seal-Head Rivnut is installed in a hole that has been drilled and countersunk



ing wing sections of an aircraft. The Rivnut holds the sections together tightly enough to withstand the strains of supersonic flight and prevent loss of fuel from the integral fuel tanks. The O-ring makes a fuel-tight seal and withstands temperatures of from —65 to 225°F. A special 150,000 p.s.i. tensile strength screw is screwed into the Rivnut to reinforce it. Goodrich is presently manufacturing a line of Rivnuts from No. 4 size up to and including the ½-inch size, in steel, brass, stainless steel and aluminum. In addition to uses in aviation, Rivnuts are also used in stoves, kitchen cabinets, washing machines, buses and trucks, vending machines, etc.

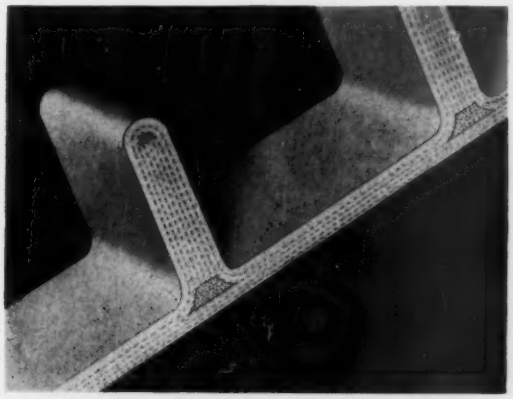
Squee Gee Crepe Soles

American Biltrite Rubber Co., Chelsea, Mass., has introduced the "Squee Gee" crepe sole, a new product offering positive footing for all vacation shoes. The same principle that prevents tires from skidding on wet surfaces or pavements has been employed in the design of

the new sole. Made of the company's "Nuron Crepe," the new soles are available in a wide range of colors. The company states that sand or pebbles are automatically expelled from the Squee Gee cuts providing sure footing on wet or dry surfaces.

Cleated Conveyor Belt

A. J. Sparks Belting Co., 862 Grandville Ave., S. W., Grand Rapids 2, Mich., has developed a cleated conveyor belt for incline or decline conveying, that is said to be new and different in that it features a fabric reinforced cleat with no joints, no cracks, no gaps. The cleat and the body of the belt are one solid piece. "Sparks Cleats" can be made any height, width and spacing, and



as stiff or as flexible as desired. They will flex around pulley diameters, compatible with weight of the belt, the company states. Colors available are white, tan or black. They can be supplied in rubber, neoprene, or special compounds for resisting grease, oil, juices, chemicals, etc. From a sanitary viewpoint, Sparks cleated belts are excellent as there are no cracks or crevices for bacteria or other undesirable matter to accumulate. The smooth curves of the cleat make cleaning simple and easy, the company states.

Aero-Pallet Cushion

Firestone Tire & Rubber Co., Akron, Ohio, is manufacturing a newly-developed collapsible rubber bag that resembles a barrel and which is designed to absorb the landing shock in parachute drops of heavy weapons and equipment. Four to ten of these "Aero-Pallet Cushions" are placed underneath a magnesium pallet carrying up to 25,000 pounds of equipment. When such a load is dropped from a cargo plane, a rush of air fills the cushions—before automatically closing diaphragms that keep them inflated. On hitting the ground, compressed air in each cushion bears the brunt of shock, then forces out a rubber cork-like plug, after which the cushion collapses. Air Force tests at El Centro, Calif., have shown that such air bags cut ground impact by two-thirds. A 1,000-pound load hits with a force of 12,000 pounds instead of 35,000.

Non-Marking Rubber Heels

Non-marking rubber heels and soles, in the premium grades, are now being marketed by the B. F. Goodrich Co., Akron, Ohio. Youngsters running through the house can now screech to a stop without leaving black rubber skid marks on the floors to show where their brakes took hold. The National Sanitary Supply Association recently petitioned the rubber industry for a non-marking rubber that could be used on shoes.

"A Plasticizer for Every Purpose"

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a plasticizer made especially for chloroprene base synthetic rubber

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PLASTICIZER

A PRIMARY PLASTICIZER for chloroprene rubbers, Ohopex R-9 is excellent for end products that require good aging under both high and low temperature conditions.

LONG LIVED TACK in the uncured stock is imparted by Ohopex R-9. According to laboratory tests the uncured stock aged for five weeks at 75° C. loses none of its tack and after 11 weeks the loss is only negligible. An uncured stock with this kind of tack offers many advantages.

LOW TEMPERATURE PROPERTIES imparted by Ohopex R-9 are extremely good with the chloroprene rubbers as indicated by a brittle point of -56° C. After aging (7 days @ 121° C., A. S. T. M. D412 and D865) the low temperature brittle point is unchanged. Other physical properties imparted by Ohopex R-9 exhibit practically no change after aging.

OTHER USES for Ohopex R-9 are as a primary plasticizer for chlorinated and other synthetic rubbers, ethyl cellulose and with vinyls as a permanent secondary plasticizer which produces some interesting properties.

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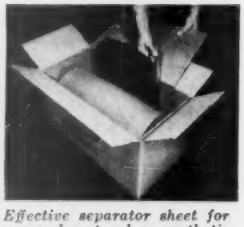
Discover the remarkable qualities of the new types of Patapar Vegetable Parchment. These special Releasing Patapars have dense, fibre free surfaces, and high resistance against penetration or migration of oil and rubber softeners. Their excellent releasing action is unaffected by passage of time. And their low cost will save you money.

Patapar Releasing Parchments are recommended as a protective backing for pressure sensitive surfaces, separator sheets for uncured, natural or synthetic rubbers, rubber tape and as a wrapping material for tacky substances.

The brochure contains samples of several different types of the new Patapars together with technical data. Why not send for your copy of the brochure today?



Effective separator sheet for uncured, natural or synthetic rubbers

Separator sheet for rubber tape — releases readily

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HI-WET-STRENGTH·GREASE-RESISTING

HEADQUARTERS FOR VEGETABLE PARCHMENT SINCE 1885

New Equipment

AccuRay Production Analyzer

An industrial computer for analyzing the production of sheet materials, announced by the Industrial Nucleonics Corp., 1205 Chesapeake Avenue, Columbus 12, Ohio, permits closer control of process equipment and aids in the supervision of operating personnel by virtue of its instantaneous presentation of product information. Named the AccuRay Production Analyzer, Model D-5,

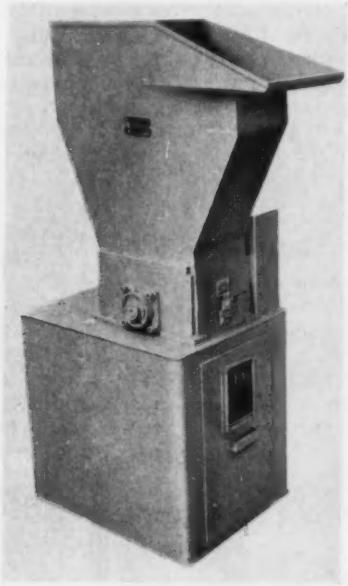
the new unit is designed to operate with Industrial Nucleonics control systems. The analyzer divides total production into five weight or thickness classifications and also shows the amount of production down time. Classifications consist of "premium", "good", and "reject". Total figures are presented by numerical counters located in the panel face. Fluorescent lighting and colored panel sections make it easy to note and interpret desired figures. Units of measurement are feet or yards, or multiples thereof.

The analyzer, which operates over a wide range of process speeds, ties in directly with production equipment to assure accurate unit counting. All control adjustments are protected from unauthorized use by a sturdy lock on the panel door. All counters have six digits. Although the Model D-5 is being used as a unit in AccuRay systems controlling rubber, plastics, steel strip and paper, it may be adapted for use with AccuRay systems controlling other than sheet materials.

Ball & Jewell M-100 Grinder

The production of a new line of low cost, all-steel granulators, termed the Marvel Series, has been announced by Ball & Jewell, Inc., 22 Franklin St., Brooklyn 22, N. Y. The first machine of the series is the M-100—a beside-the-press grinder with a capacity of up to 200 pounds an hour. A double shear knife action grinds all plastics, including elastomerics, such as polyethylene, without fluffing. The 8 x 8-inch throat opening accommodates rejects as well as sprues and runners.

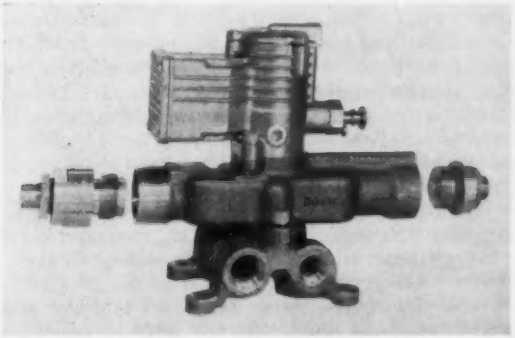
Hot and cold sprues can be fed simultaneously. The M-100 has been built with many new features such as a hopper tray height of only 49 inches to make feeding more convenient. The machine itself is very quick and easy to clean, the hopper and screen are detached in seconds, exposing the entire interior of the machine.



Specially designed hand clamps assure positive locking of the hopper with great speed. The bin is extra large, with an oversize sight glass which shows the operator when it is filled. The M-100 comes equipped with a 1½ hp motor and starter with a 2 or 3 hp motor optional. Casters are included at no extra cost.

Valvair Speed Control

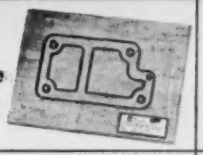
Speed control of cylinders has become increasingly important in the field of automation, and to meet this requirement Valvair Corp., 454 Morgan Avenue, Akron 11, Ohio, has designed a rather simple arrangement to add the speed control feature to its Speed King



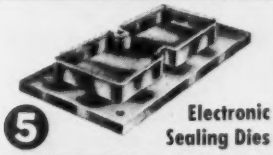
solenoid-operated valves. Conventionally, the control of the speed of a cylinder is accomplished by restricting the flow from the outlet side of the cylinder by means of a separate valve between the control valve and the

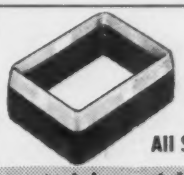
RUBBER FABRICATORS NEED ACCURATE CUTTING DIES
For Cutting
Rubber, Neoprene, Plastics, etc.
Sheeting, Foam, Sponge, Cellular,
Cured & Uncured
Gang Dies Our Specialty

3 Mallet Handle Dies


4 Steel Rule Cutting Dies

2 Steel Rule Clicker Dies


5 Electronic Sealing Dies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We can also die cut your materials on jobs you don't wish to handle yourself.

Dies for cutting gaskets, flashing from molded parts, rubber soles, foam and sponge for furniture padding, inflated toys, clothing and footwear, etc.

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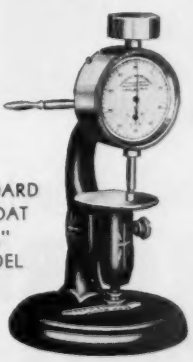
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THROAT DEPTHS
1¾" to 26"
FOOT TENSIONS
supplied by Internal Spring or Direct Weights
FOOT DIAMETERS
⅛" to 1¼"
ROLLS
Table and Roll or two Rolls
RANGE
½" or 1", also 1 CM Metric

26" DEEP THROAT MODEL

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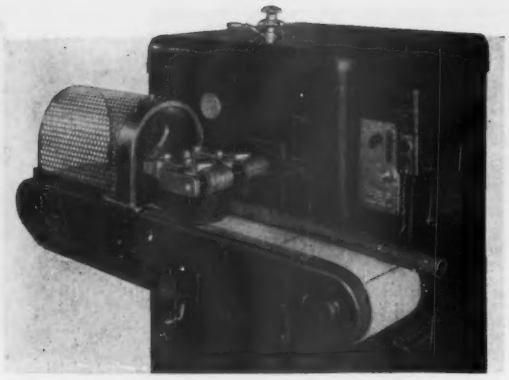

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WINK cuts any extruded material, speeds being controlled automatically to equal extruding speeds; 3000 pieces per minute are possible. Right off the belt, WINK cuts lengths of 100 feet and more from 3" dia. down to thin 1/16" slices on 1/2" dia. stock; *no distortion or collapse.* Set-up time negligible; short runs practical. Waste reduced up to 90%.

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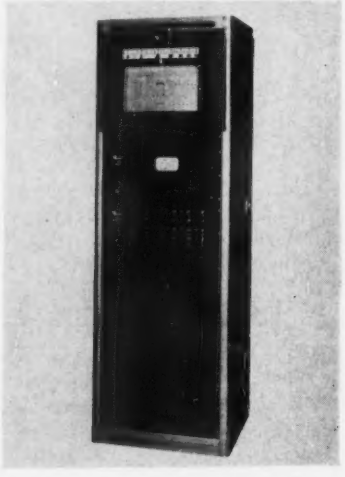
cylinder. Two of these valves are required to control the cylinder speed in both directions. Valvair accomplishes this restriction of flow through the main control valve, the Speed King, thus eliminating the need of the separate flow control valves. This control of the restriction through the main control valve is done by the addition of adjusting screws in the end caps which will restrict the stroke of the main stem of the valve and thus restrict the flow of cylinder exhaust air through the valve. Speed control will also be available as a kit to convert those valves already in service to speed control. Speed King valves with built-in speed control and conversion kits are now available for 4-way foot mounted and sub-base mounted, single and double solenoid, in sizes ¼, ⅜, ½, ¾ and 1 inch.

Bendix Ultra-Viscoson

A new electronic viscometer which successfully records and controls the viscosity of rubber cements used in laminating operations has been introduced by the Cincinnati Division, Bendix Aviation Corp., 203 West Third Street, Cincinnati 2, Ohio. The solvent, which is lost by evaporation, is automatically replenished to maintain constant cement viscosity and reproducible adhesive

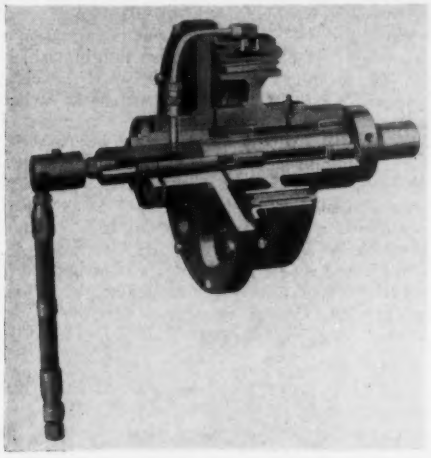


characteristics. The unit, the Ultra-Viscoson, shown in the accompanying photograph, can monitor from one to six locations simultaneously and present all information on any standard multipoint recorder.

Consisting of a probe and an electronic computer, the unit measures viscosity by exciting a thin alloy steel blade on the end of the probe with a short electrical pulse. This produces ultrasonic shear waves in the material surrounding the blade, causing waves of the material to slip back and forth. The electronic computer converts the energy required to produce the sliding motion into viscosity measurements on the dial of the computer—or on a recorder or controller connected into the system. Since viscosity measurements are made in milliseconds, readings are instantaneous regardless of manufacturing conditions. Viscosity sensing probes are available with standard pipe fittings or flanges for mounting in pipelines or reservoirs, and may have any arbitrary length required for pilot or production use.

Fawick Small Clutch Applications

A new series of small clutch applications designed for machines with power requirements of 1 to 31 horsepower is now available from the Fawick Corp., 9919 Clinton Road, Cleveland 11, Ohio. These new clutch applications are furnished in complete packaged units for on-the-job modernization of present equipment. Produced in a variety of sizes, these applications are

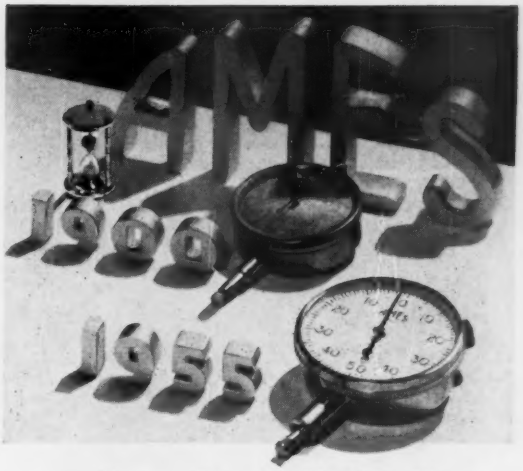


said to have all the desirable features of Fawick Airflex Type CB Clutch: 360° engagement, uniform friction pressure, instant response to electro-pneumatic controls, automatic compensation for wear to friction shoes, and complete disengagement. In addition, these applications are adaptable to cyclic or continuous operations and can be controlled either locally or remotely.

Three types of applications are included in the new series: (1) Spider Bearing Mounted with Tapered Bushing (illustrated): Feature of this application is the extended drum hub mounted on anti-friction bearings. A mating sheave or sprocket can be readily adapted to the extended portion of the drum hub; (2) Spider Gap Mounted with Tapered Bushing: This clutch-coupling makes possible simplified installation direct to a mating component, and (3) Spider Close Mounted with Tapered Bushings: This application is designed for flexible coupling service. All applications provide overload protection to equipment.

Revco, Inc., 2 East Franklin Ave., Minneapolis 4, Minn., has introduced a new model of the **Zero-Max infinitely variable speed reducer** with a constant torque rating of 100 inch-pounds (¾ hp at 450 rpm). It gives full variable speed from zero to ¼ the input speed, weighs 25 pounds, and measures 7¼ by 10¼ by 6⅝ inches excluding shafts and brackets.

Unlimited record grouping, shelf-to-operation simplicity, and drift-free stability are claimed for a new **pneumatic receiver** developed by the Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio, for instrument and control systems in power and process plants. Transmitted pneumatic signals of a measured variable are received by this unit which drives a recording pen.



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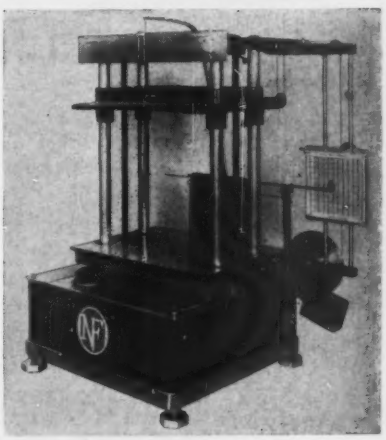

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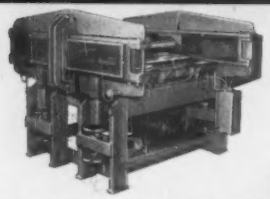

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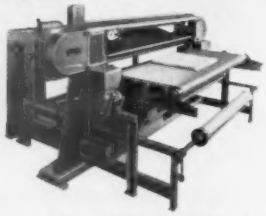

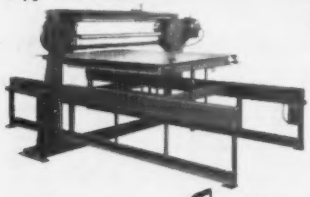

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Reviews

BOOKS

Plastics for Corrosion-Resistant Applications. By R. B. Seymour and R. H. Steiner. Published by the Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 6 x 9 in. 424 pp. $7.50.

Compiled from the extensive experiences of the authors while both were employed by the Atlas Mineral Products Co., this book provides engineers with the background information necessary in selecting the proper plastic for construction in corrosive atmospheres. It describes the relationships between the chemical and physical properties and the molecular structure of various plastics and includes comprehensive data on the use of these plastics as protective coatings, organic linings, casting resins, plastic foams, impregnants, industrial adhesives, reinforced materials, etc. Sections of the book are devoted to descriptions of plastic pipe, ductwork, valves and fittings, and the use of plastics for corrosion-resistant floors, sumps and processing vessels. Wherever possible, plastics available for a specific application are compared in tabular form for quick and easy selection of the most suitable materials. The book is divided into five specific sections and includes author and subject indexes. One of the authors, Mr. Steiner, is now associated with Naugatuck Chemical.

•

Chemical Engineering Cost Estimation. By R. S. Aries and R. D. Newton. Published by the McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. 6 x 9 in. 264 pp. $6.00.

The last few years have witnessed the publication of a good deal of factual data of a quantitative nature on the subject of cost estimating. This new book, however, is the first single volume to cover the entire scope of cost estimating, demonstrating the relationships and applications, and providing useful cost data employing a common terminology for direct application. The book has a twofold aim: first, to outline the principles of cost estimation and evaluation, and second, to provide quantitative data for application of the techniques discussed to solving problems encountered in modern industrial practice. This aim is accomplished by the authors, who deal individually with each of the components of investment, cost and profits and describe, in minute detail, methods for their determination. A text book flavor is imparted to the volume by the inclusion of a special section at the end of the book devoted to sample problems. In all, the book has 10 chapters and a subject index. A section is also devoted to the nomenclature utilized.

•

International Rubber Directory: 1955. Published by Verlag fuer Internationale Wirtschaftsliteratur, GmbH, P. O. Box 108, Zurich 47, Switzerland. 6½ x 9 in. 576 pp. $12.80.

The second edition of this international directory has been completely revised and considerably expanded. Data on rubber manufacturers in several additional countries not covered in the first edition are given and the current edition now covers rubber manufacturers in some seventy different countries. All of the countries are grouped by continent and it is relatively easy to locate any group of manufacturers in any part of the world. The listings are arranged alphabetically by city and town within the countries, rather than alphabetically by company, but each listing indicates the type of rubber products being made. This information appears in English in most cases, as well as in German or French or Spanish. The directory also includes sections devoted to German-English-French, English-German, French and French-German-English vocabularies. A buyers' guide for machinery, equipment, chemicals, raw materials, etc., is also included.

BOOKLETS, CATALOGS, etc.

The Prevention of Occupational Skin Diseases. By Dr. Louis Schwartz. Association of American Soap and Glycerine Producers, Inc., 295 Madison Avenue, New York 17, N. Y. 6 x 9 in. 48 pp.

This booklet describes, in practical terms, occupational skin diseases and their prevention. It has been prepared especially for industrial management and for those charged with public health and safety, but it should prove useful to anyone coming in contact with these problems. Much of the information that it contains will also be useful to maintenance people, custodial personnel, nurses, physicians, as well as those whose skin might be adversely affected by prolonged exposure to wet solutions that are normally non-irritating, or by materials contacted in pursuing their occupation. The urgency of the subject is indicated by the fact that about two-thirds of all occupational diseases reported to state compensation boards are skin diseases—and there are many times more cases that are unreported. Fortunately, effective preventive measures are available. Medical directors of some of our largest chemical and dye manufacturing plants, automobile plants, oil refineries, fabric manufacturing plants, and others where occupational dermatitis was formerly a severe problem, report dramatic improvement following rigid enforcement of the preventive measures described in this booklet.

•

Buschman Roller Conveyors. (Catalog No. 60A). E. W. Buschman Co., Clifton and Spring Grove Avenues, Cincinnati 32, Ohio. 8½ x 11 in. 20 pp.

This new catalog on Series 60 medium and heavy duty roller conveyors offers data and specifications on the complete line offered by the company, including capacities of rollers and bearings. Detailed cutaway views show the dustproof and grease-packed-for-life bearings with true-labyrinth metal seal, as well as integral and plain ball bearings. The rounded ends, turned-in ends, swaged, and reamed straight ends of rollers are shown in angle frames, formed or structural channel frames, with charts giving roller and frame capacities. A heavy duty type mobile unit for straight sections of a roller conveyor is illustrated, also roller curves, spur sections, sliding switches, converging sections, vertical lift and horizontal gate sections in permanent and portable types. Installation views cover many industries and include roller conveyors combined with overhead cable, live-roller and vertical reciprocating lift, belt and other types of conveyors.

•

Rubarite. Rubarite, Inc., 141 West Jackson Blvd., Chicago 4, Ill. 8½ x 11 in. 16 pp.

"Rubarite", a new rubberized material produced specifically for use in asphalt and tar, is discussed in this illustrated brochure. It is stated that Rubarite is made from a combination of unvulcanized synthetic rubber latex and minute particles of barytes, a chemically inert material. Three types of Rubarite are being produced. The types include a paving grade for bituminous concrete; a mixing grade for rubberizing asphalt prior to its use, and "Rubarite Jetlock" for rubberizing tar for jet fuel resistant airfield surfaces. The characteristics of the material are discussed in this brochure as are the properties which it imparts to bitumens. Typical construction results are also discussed.

•

Monsanto Chemicals for the Rubber Industry. Monsanto Chemicals, Ltd., Victoria St., London S.W. 1, England. 8¼ x 10¼ in. 40 pp.

This catalog lists the main products manufactured by Monsanto Chemicals, Ltd., for the rubber industry. Three general groups of products are covered, accelerators, antioxidants and ancillary products. In addition, some attention is given to the styrene-butadiene resins produced by the company. The description offered for each item is necessarily brief, but the individual products are covered by the technical bulletins referred to in the text.

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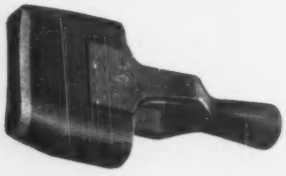

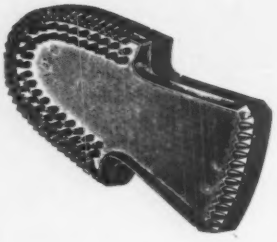

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REVIEWS (CONT'D)

Where the Chemical Industry Does Its Business. Stanford Research Institute, Stanford, Calif. 8½ x 11 in.

Relationships between the U. S. chemical industry and other segments of the national economy are graphically illustrated in this publication. For the first time, statistics on annual inter-industry sales and purchases have been reduced from complicated tables to compact, easily referenced graphs. This analysis utilized government-compiled data to establish the position in the U. S. economy of the 16 chemical and allied products and process industries by charting their dealings with other segments of U. S. industry, business and agriculture. This publication is the latest installment to the five-volume "Chemical Economics Handbook" published by the Stanford Research Institute and prepared by the Chemical Economics Service of its Economics Division. Of particular interest is the section on "Inter-Industry Purchases and Sales of the Synthetic Rubber Industry (1947)".

•

Acrylic Esters. (Bulletin F-7434). Carbide and Carbon Chemicals Co., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 8 pp.

Ethyl acrylate, n-butyl acrylate, 2-ethylbutyl acrylate and 2-ethylhexyl acrylate are described in this technical bulletin. The bulletin covers methods of polymerization, applications of polymers and copolymers, and selected references. Physical and chemical properties, shipping data, and reactions of the acrylic esters in chemical syntheses are included. Polymers and copolymers of the acrylic esters, the bulletin points out, are used in the manufacture of adhesives, protective coatings, leather and textile finishes, paper treating, synthetic fibers, oil additives, plasticizers, and specialty rubbers. Acrylic esters are also important intermediates in the manufacture of pharmaceuticals, resins and plastics, insecticides, and numerous other compounds.

•

Diamond Chlorinated Solvents. Chlorinated Products Division, Diamond Alkali Co., 300 Union Commerce Building, Cleveland 14, Ohio. 8½ x 11 in. 14 pp.

This factual technical bulletin concisely reviews the complete line of specialized chlorinated solvents produced by Diamond Alkali. Products discussed in the bulletin include methyl chloride, methylene chloride, chloroform, carbon tetrachloride, and perchlorethylene. The bulletin presents, in easy-to-read, quick-reference digest form, basic data on each product—description, physical properties, typical shipping analysis, major uses, handling precautions, and size of containers for shipment.

•

Look to Linde for Silicones. Linde Air Products Co., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 4 pp.

The principal silicones sold by Linde Air Products are described in this catalog. Listed are the various silicones, in liquid and solid forms, in the broad categories of water repellents; oil and oil emulsions; electrical insulating resins; silicone rubber gum stock and compounds; and silicones which make excellent anti-spatter, anti-foaming materials, etc. In addition, there are silicone intermediates for the paint and other industries, and Linde silicone monomers which are available for experimental or commercial development.

•

Magnetic Pulleys and Magnetic Pulley Separators. (Bulletin No. 303-C). Stearns Magnetic, Inc., Milwaukee 46, Wisc. 8½ x 11 in. 16 pp.

Detailed specifications on the company's magnetic pulleys and pulley separators are contained in this bulletin. Of particular interest is a new simplified selection method which makes it easy for a user to accurately select the right size pulley for his application. Another highlight of the bulletin is the new 2-coil pulley design which creates a magnetic field of increased strength and more effective shape, enabling the use of smaller diameter pulleys than was previously possible in many applications.

An Engineering Interpretation of the Economic and Financial Aspects of American Industry. Volume XI. The Automotive Industry. George S. Armstrong & Co., Inc., 551 Fifth Avenue, New York 17, N. Y. 8½ x 11 in. 88 pp.

The automotive industry is so comprehensive in its all-embracing influence that it was necessary, in the writing of this booklet, to use perceptive discrimination in selecting from the many factors available those which have had a controlling effect upon the product and the industry. The progress of the automotive industry has not taken an even course. The record shows that over 1,500 different makes of automobiles were produced in the past 100 years. Today, the output is heavily concentrated in three companies which in 1954 produced 96% of the passenger car total. In examining the automotive industry, this interesting booklet takes into account such subjects as the historical development of the automobile; the materials used and progress made in their quality and availability; roads, highways and turnpikes; marketing and financing; economic service and the significance of automotive equipment, etc.

•

Controls and Techniques for Better Management. (General Management Series: Number 176). American Management Association, 330 West 42nd St., New York 36, N. Y. 6 x 9 in. 64 pp. $1.00 (members); $1.75 (non-members).

This publication is a collection of papers presented at the General Management Conference of the American Management Association held in Los Angeles, Calif., early this year. One of the papers in the booklet discusses operations research in non-technical terms, and explains what management can expect from the new tools which assist it in the decision-making process. Another paper describes how a company set up controls governing company growth. Still another paper discusses how research and development are coordinated and controlled in one organization. Other papers review certain aspects of industrial relations practice, such as collective bargaining, cost reduction training, and personnel testing.

•

Synthetic Rubber: The Story of Philprene. Rubber Chemicals Division, Phillips Chemical Co., 318 Water Street, Akron 8, Ohio. 6 x 8½ in. 12 pp.

The story of synthetic rubber is really a story of American ingenuity. This booklet discusses the part played by Phillips in the development of synthetic rubber. It also explains how the company's recent purchase of a synthetic rubber plant from the government fits into over-all company operations. The booklet explains in lay terms how synthetic rubber is made and what Phillip's part is in the industry.

•

Constant Speed Texrope Drives. (Tex-Book 20P40). Allis-Chalmers Manufacturing Co., 979 South 70th St., Milwaukee, Wisc. 8½ x 11 in. 76 pp.

Multi-color tables for quick and easy selection of constant speed "Texrope" V-belt drives are incorporated in this new booklet. In addition to providing selection tables for "Texrope" belts, the booklet features valuable information on design features, basic drive principles and technical data on sheaves as well as helpful hints for economical, safe and dependable operation of V-belt drives.

•

Silastic. Dow Corning Corp., 592 Saginaw Road, Midland, Mich. 8½ x 11 in. 4 pp.

This two-color bulletin offers a briefing on "Silastic", the Dow Corning silicone rubber. Divided into five sections, the publication details the properties and performance of the material and the manner in which it is affected by extreme temperatures, weathering, compression, chemicals and dielectric service. The bulletin is heavily illustrated with charts, tables, graphs and actual application photographs.

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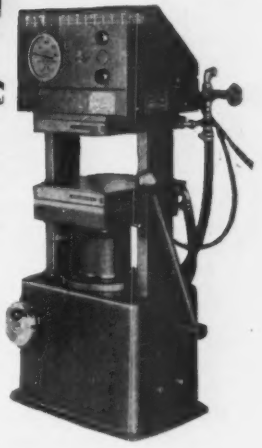

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NEWS-PRICES

NEW YORK, SEPTEMBER 6, 1955

Natural Rubber

Since our last report (August 5), the price of spot rubber on the New York Commodity Exchange has moved in the rather wide range of 512 points, high for the period being 48.12c reached on September 2, and low being 43.00c reached on August 15. The average price of spot rubber for the month of August was 45.85c based on 23 trading days. This compares with an average of 40.84c in the previous month.

The pattern of price movements in rubber remains the same as has been witnessed for some weeks past. Each time the market establishes a new high there develops a period of hesitancy and some price reaction followed by a resumption of the upward trend.

The one restraining influence at the moment, which many in the trade believe to be remote, is the possibility of some action in official Washington in connection with rotation rubber. Now that the natural rubber price structure is approaching the 50c level, it is entirely possible that Washington may consider the rubber situation in a different light than was the case in July.

Ceylonese Rubber Production

Ceylon, the third largest producer of rubber in the world, is experiencing such a boom in its rubber industry that the Ceylonese government is reported to be finding it difficult to meet its commitment of rubber delivery to Communist China. Under its contract to barter rubber for rice, Ceylon must send Communist China 50,000 tons of rubber this year.

According to reports from Ceylon, rubber producers are withholding supplies to get better prices. Twice the government has increased prices during the last few weeks until now it is paying 28c a pound for rubber intended for Red China. However, if producers were allowed to sell in the open market they could get about 45c a pound.

The producers, however, are allowed to sell in the open market only after the government has been able to buy its full quota of 50,000 tons from them for Red China. Producers are further reluctant to sell because the Ceylonese government is about to send a trade delegation to Peiping to try to get higher prices for Ceylonese rubber.

Polish Buying Increases

Reports from Singapore, London and Holland speak of persistent buying by Poland. However, the quantities indicated run into thousands of tons and it is felt that a good deal of the rubber actually is going to Russia. The Polish demands are restricted to No. 1 and No. 2 Ribbed Smoked Sheets.

Purchases a few weeks back were for afloat rubber. Then the demand turned to spot rubber and now the demand is restricted, at least for the moment, to September shipment. Current reports indicate the likelihood of a continuation of this buying, and this is reported to be having a great deal to do with shaping sentiment abroad.

Price Data

Closing Rubber Prices on New York Commodity Exchange (No. 1 R.S.S. Contract)

FROM AUGUST 6 TO SEPTEMBER 6

Aug.	Spot	Sept.	Dec.	Mar.	May	Sales
6	....	....	....	....	....	....
7	....	....	....	....	....	....
8	46.75	46.80	46.30	45.40	44.45	327
9	47.38	47.70	47.10	46.15	45.10	463
10	45.12	45.50	44.75	43.60	42.65	440
11	46.00	46.50	45.75	44.70	43.60	383
12	44.50	44.75	44.25	43.10	42.00	271
13	....	....	....	....	....	....
14	....	....	....	....	....	....
15	43.00	43.35	42.80	41.70	40.60	584
16	45.50	45.95	45.15	43.95	42.98	380
17	45.62	46.00	45.35	43.90	42.80	677
18	44.00	44.30	43.75	42.60	41.50	433
19	46.12	46.30	45.60	44.25	43.10	426
20	....	....	....	....	....	....
21	....	....	....	....	....	....
22	45.88	46.25	45.60	44.25	43.10	196
23	46.50	47.25	46.50	45.20	43.85	326
24	46.50	47.45	46.45	45.15	43.90	230
25	45.50	45.80	45.40	44.15	42.90	169
26	45.88	46.50	45.83	44.65	43.40	169
27	....	....	....	....	....	....
28	....	....	....	....	....	....
29	46.25	46.65	46.00	44.80	43.50	69
30	45.75	46.20	45.70	44.50	43.20	108
31	46.25	46.75	46.20	44.85	43.65	188
Sept.						
1	47.50	48.00	47.30	46.05	44.75	368
2	48.12	49.00	48.20	46.85	45.75	413
3	....	....	....	....	....	....
4	....	....	....	....	....	....
5	....	....	....	....	....	....
6	48.00	48.80	47.60	46.20	45.00	245

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.48
September	.48
October	.47⅞
Thin Latex Crepe:	
Spot	.48⅞
Thin Brown Crepe, No. 2	.38¼
Flat Bark Crepe	Nom.

London Market

(Standard Smoked Sheets)

Oct.-Dec.	49.90 - 50.04
Jan.-Mar.	47.87 - 48.01

Singapore Market

(Standard Smoked Sheets)

October	49.03 - 49.10

Middling Upland Quotations

	Aug. 5	September 6		
	Close	High	Low	Close
Oct.	33.68	33.62	33.53	33.55
Dec.	33.91	33.67	33.54	33.54
Mar.	33.80	33.44	33.25	33.26

Notes and Quotes

W. S. Richardson, president of the B. F. Goodrich Co., has urged that margin requirements be increased for speculators dealing in the crude rubber futures market in order "to stop current wild speculation in the purchase of this vital material." Mr. Richardson warned that "if growers of crude rubber do not adopt channels of distribution which by-pass speculators the complete changeover to man-made rubbers in the United States will be greatly accelerated." Mr. Richardson said that "a more than fair price" for crude rubber—and one that would provide a good return—need not be above 23c a pound. This would make it competitive with synthetic which sells on a competitive basis at that level. Actually, he said, there are some locations in the world and a great number of plantations that can produce crude rubber at half that price. Mr. Richardson pointed out that there need never be a complete changeover to synthetic rubber in the U. S. if the growers of natural move quickly to insure an adequate supply and a price competitive with synthetic rubber.

Synthetic Rubber

Writing in the September issue of *Natural Rubber News*, H. C. Bugbee, president of the Natural Rubber Bureau, states that production of GR-S type rubber during the first half of 1955 was at an annual rate of 735,000 tons. Mr. Bugbee says that after conversations with several of the larger manufacturers of synthetic rubber, the conclusion has been reached that production during the second half of 1955 will be up approximately 15% over the first half rate, resulting in a total GR-S type production for 1955 (including the oil in oil-extended rubber) of 785,000 tons.

After checking with several synthetic rubber producers who are also manufacturers of rubber products and independent producers of synthetic rubber and rubber product manufacturers who have no synthetic rubber manufacturing tie-up, it has been found there is an apparent shortage of special grades of GR-S type rubber. For the standard use types such as tire rubbers, however, no shortages have been encountered.

Discusses Freight Rates

Mr. Bugbee states that the switch from a standard freight rate under government control to actual rates from shipment point to destination, in many instances, substantially affects adversely the delivered price of many special types. Also, Mr. Bugbee declares, the new synthetic plant owners, in many circumstances, understandably find it uneconomical to make special runs of small volume use polymers without raising the price to take care of the added expense involved.

Naturally, he states, the buyer has a reluctance to pay more than the price he paid under similar government operation which, being completely centralized, did not face the same production problems as an individual plant owner. These factors and others were anticipated before the transfer to private industry took place and actually the distribution dislocations which have occurred have been much less upsetting than had been predicted, Mr. Bugbee declares.

Despite the relatively high price for natural rubber, Mr. Bugbee notes, there has been very little, if any, switching from natural rubber to synthetic in the manufacture of tubeless tires. Demand for tubeless tires is still at record levels and there is an apparent reluctance because of quality factors to risk or bother with a switch-over at this stage. Recent tire price increases, Mr. Bugbee points out, appear to bear out the premise that considerable natural rubber is still going into tubeless tire manufacture. How long this will continue, Mr. Bugbee says, remains to be seen.

Synthetic Shipments Abroad

The easier dollar situation abroad has also provided an incentive for manufacturers of synthetic rubber to begin building up their export business, particularly those with overseas branch plants. Exports of GR-S in 1954 totaled 11,000 tons. The annual export rate based on May/June shipments totals 37,000 tons.

The Secretariat of the Rubber Study Group estimates that world consumption of synthetic rubber in the year from July, 1954, through June, 1955, amounted to 872,500 tons. It is estimated that 955,000 tons of synthetic rubber will be consumed in the world in 1955. The Secretariat states that in 1954, total synthetic rubber consumption amounted to 740,000 tons.

PRICES OF COMMERCIALLY AVAILABLE SYNTHETIC RUBBER POLYMERS

(dry types—per pound carload unless otherwise specified)

Butadiene-Acrylonitrile Types

Butaprene NAA	.5400 [2]
Butaprene NF	.4900 [2]
Butaprene NL	.5000 [2]
Butaprene NXM	.5800 [2]
Chemigum N1	.6400 [2]
Chemigum N3	.5800 [2]
Chemigum N5	.5800 [2]
Chemigum N6	.5000 [2]
Chemigum N7	.5000 [2]
Hycar OR-15	.5800 [2]
Hycar OR-25	.5000 [2]
Paracril B	.5000 [2]
Paracril BJ	.5000 [2]
Paracril C	.5800 [2]
Polysar Krynac	.5000 [2]
Polysar Krynac 801	.5800 [2]
Polysar SS-250-K	.3000 [2]

Butadiene-Styrene Types

ASRC 1500	.2410 [2]
ASRC 1502	.2410 [2]
Baytown 1600	.1850 [2]
Baytown 1601	.1850 [2]
Baytown 1602	.1850 [2]
Baytown 1801	.1700 [2]
Butaprene S-1000	.2300 [2]
Butaprene S-1001	.2300 [2]
Butaprene S-1004	.2300 [2]
Butaprene S-1005	.2800 [2]
Butaprene S-1006	.2300 [2]
Butaprene S-1009	.2455 [2]
Butaprene S-1010	.2450 [2]
Butaprene S-1012	.2700 [2]
Butaprene S-1013	.2500 [2]
Butaprene S-1014	.2700 [2]
Butaprene S-1015	.2800 [2]
Butaprene S-1500	.2300 [2]
Butaprene S-1502	.2300 [2]
Butaprene S-1703	.1950 [2]
Butaprene S-1705	.1925 [2]
Butaprene S-1710	.1775 [2]
Butaprene S-1712	.1775 [2]
Copo 1500	.2410 [3]
Copo 1502	.2410 [3]
Copo 1712	.1712 [3]
G-G 1001	.2410 [3]
G-G 1002	.2435 [3]
G-G 1006	.2410 [3]
G-G 1500	.2410 [3]
G-G 1501	.2410 [3]
G-G 1502	.2410 [3]
G-G 1703	.2060 [3]
G-G 1705	.2035 [3]
G-G 1706	.2035 [3]
G-G 1707	.1910 [3]
G-G 1709	.1885 [3]
G-G 1710	.1885 [3]
G-G 1711	.1885 [3]
G-G 1712	.1885 [3]
Hycar OS-10	.5500 [2]
Naugapol 1016	.2550 [3]
Naugapol 1018	.2600 [3]
Naugapol 1019	.2550 [3]
Naugapol 1021	.2900 [3]
Naugapol 1022	.2600 [3]
Naugapol 1023	.2650 [3]
Naugapol 1503	.2550 [3]
Naugapol 1504	.2650 [3]
Philprene 1000	.2500 [1]
Philprene 1001	.2500 [1]
Philprene 1006	.2500 [1]
Philprene 1009	.2550 [1]
Philprene 1018	.2575 [1]
Philprene 1019	.2525 [1]
Philprene 1100	.1990 [1]
Philprene 1104	.1940 [1]
Philprene 1500	.2500 [1]
Philprene 1502	.2500 [1]
Philprene 1503	.2525 [1]
Philprene 1600	.2000 [1]
Philprene 1601	.2000 [1]
Philprene 1602	.2000 [1]
Philprene 1605	.1940 [1]
Philprene 1703	.2120 [1]
Philprene 1706	.2100 [1]
Philprene 1708	.1970 [1]
Philprene 1711	.1940 [1]
Philprene 1712	.1940 [1]
Philprene 1803	.1800 [1]
Plioflex 1000	.2425 [3]
Plioflex 1006	.2425 [3]
Plioflex 1502	.2425 [3]
Plioflex 1703	.2075 [3]
Plioflex 1710	.1900 [3]
Polysar Krynol	.1890 [2]
Polysar Krynol NS	.1940 [2]
Polysar "S" Types	.2300 [2]
S-1000	.2300 [2]
S-1001	.2300 [2]
S-1006	.2300 [2]
S-1100	.1850 [2]
S-1500	.2300 [2]
S-1501	.2300 [2]
S-1502	.2300 [2]
S-1600	.1850 [2]
S-1602	.1850 [2]
S-1703	.1950 [2]
S-1706	.1925 [2]
S-1707	.1800 [2]
S-1709	.1775 [2]
S-1712	.1775 [2]
S-1801	.1700 [2]
Texas-U. S. 1000	.2425 [3]
Texas-U. S. 1001	.2425 [3]
Texas-U. S. 1002	.2450 [3]
Texas-U. S. 1006	.2425 [3]
Texas-U. S. 1007	.2425 [3]
Texas-U. S. 1009	.2475 [3]
Texas-U. S. 1012	.2425 [3]
Texas-U. S. 1013	.2500 [3]
Texas U. S. 1500	.2425 [3]
Texas-U. S. 1703	.2075 [3]
Texas-U. S. 1707	.1925 [3]
Texas-U. S. 1711	.1900 [3]

Butyl Rubbers

Enjay Butyl 035	.2300 [2]
Enjay Butyl 150	.2300 [2]
Enjay Butyl 165 NS	.2400 [2]
Enjay Butyl 215	.2300 [2]
Enjay Butyl 217	.2300 [2]
Enjay Butyl 218	.2300 [2]
Enjay Butyl 268 NS	.2400 [2]
Enjay Butyl 325	.2300 [2]
Enjay Butyl 365 NS	.2400 [2]
Polysar Butyl Types	.2300 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [2]
Neoprene Type GN	.4100 [2]
Neoprene Type GN-A	.4100 [2]
Neoprene Type GRT	.4200 [2]
Neoprene Type KNR	.7500 [2]
Neoprene Type S	.4200 [2]
Neoprene Type W	.3900 [2]
Neoprene Type WRT	.4500 [2]

Silicone Rubbers

	(prices l.c.l.)
GE (compounded)	2.50 [2]
GE Silicone Gum (not compounded)	4.00 [2]
Silastic (compounded)	1.95 [2]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.4700 [2]
Thiokol Type FA	.6400 [2]
Thiokol PR-1	.9500 [2]
Thiokol Type ST	1.00 [2]

(latices—all prices per pound dry weight)

Butadiene-Acrylonitrile Types

Chemigum 200	.4900 [2]
Chemigum 235	.5400 [2]
Chemigum 236	.5400 [2]
Chemigum 245	.4600 [2]
Chemigum 246	.4600 [2]
Hycar 1512	.4600 [2]
Hycar 1551	.5400 [2]
Hycar 1552	.4600 [2]
Hycar 1561	.5400 [2]
Hycar 1562	.4600 [2]
Hycar 1571	.5900 [2]
Hycar 1572	.5100 [2]
Hycar 1577	.4600 [2]

Butadiene-Styrene Types

Butaprene S-2000	.2600 [2]
Butaprene S-2001	.2600 [2]
Butaprene S-2002	.2850 [2]
Butaprene S-2003	.2950 [2]
Butaprene S-2004	.2950 [2]
Butaprene S-2006	.2600 [2]
Copo 2101	.2800 [3]
Copo 2102	.3100 [3]
Copo 2105	.3100 [3]
Copo X-765	.2900 [3]
Pliolite 2101	.3000 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite X-765	.3000 [3]
Naugatex 2000	.2630 [2]
Naugatex 2001	.2630 [2]
Naugatex 2002	.2880 [2]
Naugatex 2005	.3000 [2]
Naugatex 2096	.2630 [2]
Naugatex 3101	.2850 [2]
Naugatex 2105	.3120 [2]
Naugatex X-767	.3230 [2]
S 2000	.2275 [2]
S 2004	.2600 [2]
S 2101	.2250 [2]

Neoprene

Neoprene Latex 571	.3700 [2]
Neoprene Latex 572	.3900 [2]
Neoprene Latex 601-A	.4000 [2]
Neoprene Latex 735	.3800 [2]
Neoprene Latex 736	.3800 [2]
Neoprene Latex 842-A	.3700 [2]
Neoprene Latex 950	.4700 [2]

Polysulfide Rubbers

Thiokol Type MX	.7000 [2]
Thiokol Type WD-2	.9200 [2]
Thiokol Type WD-6	.7000 [2]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid.

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MARKETS

NEWS-PRICES

NEW YORK, SEPTEMBER 6, 1955

Reclaimed Rubber

The trade reports a good level of market activity in reclaimed rubber during the past period. All plants have now concluded their vacation shutdown periods and with the exception of Naugatuck, which was hard hit by the recent floods in the east, all plants report a healthy market. Naugatuck is expected to be back in operation by the middle of September.

The Department of Commerce reports that 165,168 long tons of reclaimed rubber were produced in the first six months of 1955, against the 129,284 long tons produced in the first six months of the preceding year. The Department estimates that 161,798 long tons of reclaim were consumed in the first half of the current year, contrasted with the 126,847 long tons consumed in the first half of 1954.

In the first six months of the current year, 6,430 long tons of reclaim were exported, compared with 5,872 long tons in the first half of 1954. As of June 30, 1955, there were 29,676 long tons of reclaim on hand, against the 30,845 long tons on hand on June 30, 1954.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.10½
First Line Whole Tire	.10
Second Line Whole Tire	.09½
Third Line Whole Tire	.09¼
Fourth Line Whole Tire	.08¾
Black Carcass	.14¼
No. 1 Light Colored Carcass	.20¾
No. 1 Select Peel	.11¾
No. 1 Peel	.10½
Butyl Tube Reclaim	.15
Natural Rubber Black Tube	.15
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

More interest was noted in the scrap rubber market during the latter part of this period due, in part, to the fact that reclaiming operations at Naugatuck were expected to resume by the middle of September. Meanwhile, moderate tonnages of scrap have been moving to Eastern reclaimers outside the flood area.

According to the Bureau of the Census, April exports of scrap rubber rose to 3,502,808 pounds, valued at $143,990, from 1,113,170 pounds worth $53,729 in March. April imports of scrap rubber were 1,421,127 pounds less than in March. The April arrivals totaled 1,088,687 pounds valued at $40,228, compared with 2,510,814 pounds worth $125,067 in March. The 2,368,638 pound rise in April exports generally reflected large shipments to traditional purchasers of U. S. scrap rubber.

(Prices Delivered Akron)

Mixed tires	ton	16.00
Light colored carcass	lb.	.05½
No. 1 peelings	ton	45.00
No. 2 peelings	ton	30.00
No. 3 peelings	ton	24.00
Buffings	ton	17.00
Truck and Bus S.A.G.	ton	17.00
Passenger S.A.G.	ton	15.00
Natural Rubber Red Tubes	lb.	.08
Natural Rubber Black Tubes	lb.	.06
Butyl Rubber Tubes	lb.	.07½

Tire Fabrics

According to the trade, a greater demand for lightweight coating fabrics has developed during the past few weeks due, in part, to a switch by some automobile manufacturers from heavier weight base fabrics for plastic coating to lightweight types. The switch to lighter fabrics is apparently being done in order to reduce costs. The lighter type of wide goods sell for considerably less than the heavier types of goods.

One major automobile manufacturer is reported to have switched from a sateen construction to the 59-inch, 1.85 yard drill. Others are said to have switched from heavier goods to wide sheetings. The spurt of buying on the 59-inch, 1.85 yard drill, however, was not entirely due to buying by automobile manufacturers. The 59-inch, 1.85 yard drill also is selling for plastic coating.

Industrial Cotton Yarns

Cotton yarns for various industrial uses have been selling a little more briskly in recent weeks. Higher plied counts are being purchased by weavers for trim in automobile interiors and low count, part-waste insulating yarns are being purchased in fair-sized quantities.

In low count carded insulating yarns, heavier buying developed as more suppliers of copper came back into the market following the recent termination of a strike in these plants. Most wire insulators, however, still were purchasing carded low count yarns on a relatively nearby basis for current operations.

Dacron and Saran in Hose

A strong, lightweight industrial fire hose made with Dacron polyester fiber has recently been put into production by Quaker Rubber. The new hose is composed of Dacron as the outer layer and has neoprene for the inner tubing. Sales of about 250,000 feet are expected in 1955. The National Plastics Co. has announced a 5 in 1 webbed Saran filament for use in hose coverings. Three companies are now using the braid for vacuum hose, where the resistance to abrasion makes the fiber ideal for that use.

According to the Textile Economics Bureau, shipments of rayon and acetate filament yarn to the tires and related uses trade continued to increase from the low point of 69,600,000 pounds in the third quarter of 1954. The April-June shipments of 104,300,000 pounds showed a 6% gain over the first quarter of 1955 and a substantial 29% increase over the comparable period of the preceding year.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.76½
1650	lb.	.73½
2200	lb.	.73

Nylon Tire Cord

210	lb.	2.00
840	lb.	2.00

Rayon Graded Fabric

1100	lb.	.72
1650	lb.	.69½
2200	lb.	.68½

Cotton Chafers

14.4 oz. (per square yard)	lb.	.70
9.25 oz. (per square yard)	lb.	.65
11.65 oz. (per square yard)	lb.	.61
8.9 oz. (per square yard)	lb.	.67

Liquid Latex

Natural: According to Latex & Rubber, Inc., no unusual activities were observed in the natural latex market during the month of August. Floods which interrupted GR-S type latex production at Naugatuck tended to firm the market for Hevea latex. Hevea latex consumption is usually at its seasonal low during July and August, and current statistics reflect this situation.

Hevea latex prices continued to advance during the period, paced by the price for No. 1 R.S.S. Nominal prices ranged from 53 to 60½c per pound total solids for A.S.T.M. Centrifuged Hevea latex, rail tank car quantities, f.o.b. cars, East Coast port.

No reasonably valid prediction of the future trend of prices can be given. Some in the trade are of the opinion that there will be further substantial advances in the price of No. 1 R.S.S. Still others claim that the peak has now been reached and a leveling-off period is in the offing.

Synthetic: Prices for GR-S type latices currently range between 26 and 32.3c per pound total dry solids in rail tank cars, f.o.b. producing plant. Prices of these latices do not fluctuate daily as do Hevea latex prices. It would appear that published prices will hold for three to six month periods. The trade believes that present prices will be reviewed and that present prices will either be revised or confirmed on or about January 1, 1956.

Current prices for neoprene latices range between 37 to 47c per pound dry solids in tank cars, f.o.b. Louisville, Ky. Prices for N-type latices currently range between 35 to 59c per pound dry solids in tank cars, f.o.b. point of shipment, minimum freight to buyer's destination within the United States provided by seller.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the rather narrow range of 55 points since our last report (August 5), high for the period being 34.80c reached on August 18, and low being 34.25c reached on September 6. The average price of middling uplands for the month of August was 34.53c based on 23 trading days. This compares with an average of 34.61c in July.

Cotton crop news during the past period has been mixed, and there appears to be a general impression that the next government report will show a downward revision from the August 1 report of 12,728,000 bales. Some private reports are down to 12,300,000 bales. Insect damage is said to have reduced yield prospects in the eastern belt and in the eastern part of Texas.

The Department of Agriculture recently reported that the nation's cotton supply may dip slightly in 1956 for the first time in five years. The 1955-56 cotton supply is estimated at 23,900,000 bales, about 400,000 bales more than in 1954-55 and the second largest on record. The Department said that consumption in 1955-56 may approach 13,000,000 bales, compared with 12,400,000 bales in 1954-55.

If these estimates hold, the carryover of cotton on August 1, 1956, the beginning of the next marketing year, will be slightly below the 11,100,000 bale carryover on August 1 of this year. The carryover has increased each year since 1951 when it was 2,300,000 bales.

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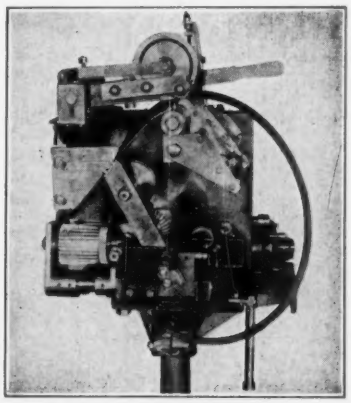
Truck and Heavy Service Tires



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MONSANTO

STATISTICS

of interest to the rubber industry

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1926	417,643	366,200	17,671	72,510
1927	431,246	373,000	27,775	99,282
1928	439.731	437,000	32,159	65,454
1929	565 087	467,400	36,485	118,609
1930	487,628	376,000	30,205	201,000
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20 937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600.479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1954:				
Nov.	45,474	53,326	798	105,025
Dec.	43,557	55,096	775	102,943
1955:				
Jan.	49.941	56,911	909	101,050
Feb.	50,880	50,997	718	97,189
Mar.	61,250	58,472	691	102,058
Apr.	61,113	53,781	892	101,620
May	61,042	54,746	683	106,650
June	52,762	56,282	682	101,491
July	.....	46,357	683	106,432

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1938	397,640	125,373,864	11.944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1954:					
Oct.	42,221	19,902,225	7,210	4,469,492	49,431
Nov.	39,139	19,244,326	6,335	3,944,396	45,474
Dec.	34,668	18,272,151	8,889	6,208,294	43,557
1955:					
Jan.	42,088	22,245,606	7,853	5,473 260	49,941
Feb.	44,770	26,161,643	6,110	4,196,213	50,880
Mar.	53,639	33,482,831	7,611	5,987,304	61,250
Apr.	52,563	33,425,499	8,549	7,235,327	61,112
May	52,192	32,621,824	8,849	6,968,726	61,041

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America	Rest of World*	Total*
1943	75,000*	100,000*	105,500	70,370	41,900	72,507	465,000
1944	25,000*	50,000*	98,500	60,419	49,946	77,000	360,000
1945	8,600*	10,000*	97,500	12,000*	47,125	73,570	250,000
1946	403,719	175,000*	94,000	19,975	39,678*	105,080	837,500
1947	646,362	277,951	89,000	38,128	34,928*	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158*	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318*	225,659	1,490,000
1950	694,090	696,472	113,500	48.482	26,902*	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777*	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475*	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318*	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833*	280,112	1,802,500
1954:							
Oct.	50,251	69,874	7,545	7,771	2,505*	24,419	162,500
Nov.	54,834	54,899	9,893	8,963	2,621*	25,313	157,500
Dec.	54,645	70,282	11,157	10,223	2,282*	30,264	180,000
1955:							
Jan.	55,413	40,719	9,614	5,926	4,906*	22,368	140,000
Feb.	50,526	70,651	4,485	1,973	2,405*	28,878	157,500
Mar.	52,483	47,394	4,892	4,231	2,627*	28,147	140,000
Apr.	44,716	48,198	7,049	4,708	500*	26,823	135,000
May	49,798	47,960	5,440	5,748	500*	16,998	135,000

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1943	488,525	66,730	32,896	150,000	156,104	907,500
1944	710,783	86,977	34,310	132,500	160,690	1,125,000
1945	799,009	91,047	41,836	87,500	108,164	1,127,500
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2 335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	545,250	393,844	2,507,500
1954:						
Oct.	114,279	25,067	5,756	49,500	31,994	227,500
Nov.	110,613	20,715	6,503	49,500	32,747	220,000
Dec.	119,226	21,238	6,236	49,250	32,764	227,500
1955:						
Jan.	125,290	24,645	6,128	45,500	35,622	237,500
Feb.	118,611	21,238	6,947	44,000	30,563	222,500
Mar.	135,590	22,648	7,508	48,250	36,992	250,000
Apr.	125,009	24,872	6,828	52,500	33,922	242,500
May	130,518	.....	7,106	.....	.....	247,500
June	137,116	.....	.....	.....	.....	.....

Source: International Rubber Study Group. * Estimated.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

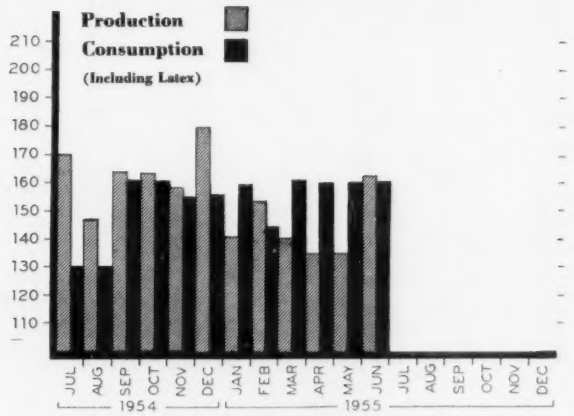
Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458.064
1947	1,982	2,276,531	2,878	1,496.887	392	779.591
1948	1,195	805,078	3,401	2,377,765	423	542.788
1949	1,391	814,554	1,043	834,978	197	189.021
1950	2,117	1,589,885	1,789	1.515.162	541	745,418
1951	2.452	1,973.271	1,669	2,608.359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166.837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1954:						
July	104	54,957	201	240,477	24	37,749
Aug.	30	23,404	151	200,944	58	68,298
Sept.	107	43,193	313	335,832	37	32,492
Oct.	85	49,323	263	328,656	14	24,116
Nov.	108	76,392	156	188,426	27	49,170
Dec.	83	49,271	145	169,503	17	20,087
1955:						
Jan.	41	48,160	205	247,639	12	24,628
Feb.	28	24,321	129	102,572	37	36,566
Mar.	72	48,365	184	205,480	36	48,134
Apr.	83	58,184	113	122,952	36	32,463
May	44	35,402	121	119,278	52	48,021

Source: U. S. Department of Commerce.

STATISTICS at a glance

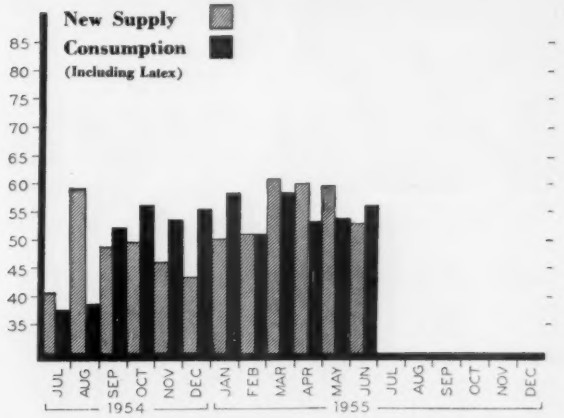
NATURAL RUBBER—WORLD

(thousands of long tons)



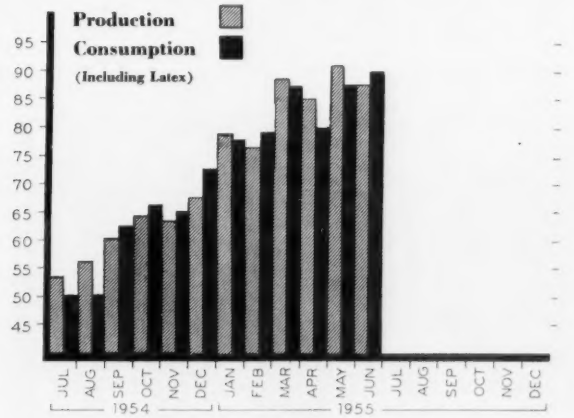
NATURAL RUBBER—UNITED STATES

(thousands of long tons)



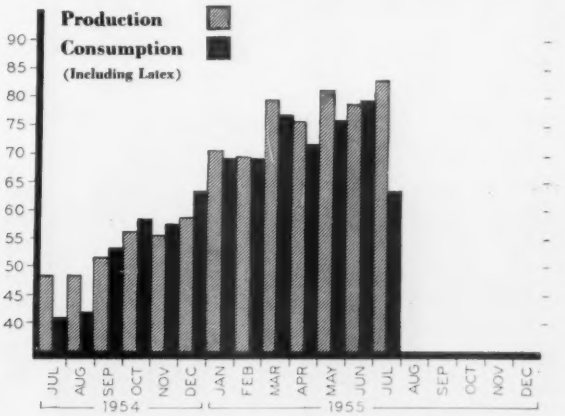
SYNTHETIC RUBBER—WORLD

(thousands of long tons)



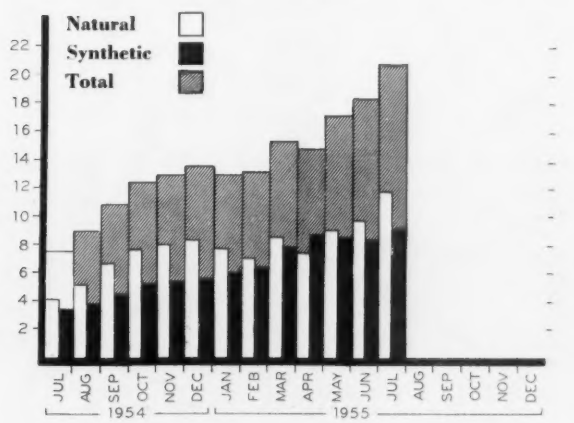
SYNTHETIC RUBBER—UNITED STATES

(thousands of long tons)



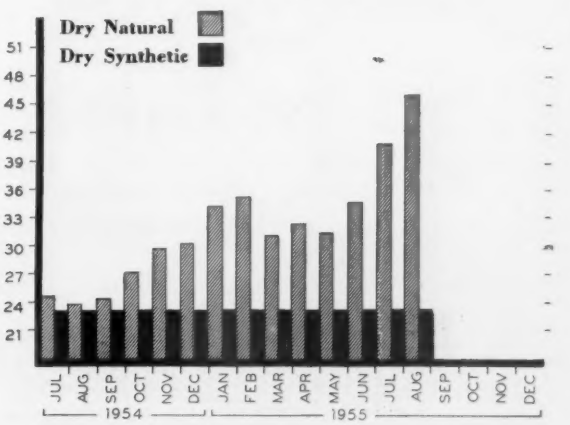
LATEX CONSUMPTION IN THE U. S.

(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC

(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1946	613,408	47,766	80,823	5,738	747,735
1947	408,858	31,495	62,824	6,618	509,795
1948	405,492	34,848	56,662	7,012	504,014
1949	310,539	35,215	54,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906
1951	704,529	58,907	76,475	15,333	855,244
1952	654,854	65,745	81,630	16,228	818,447
1953	680,728	80,495	79,801	20,198	861,222
1954	490,405	69,150	58,802	21,396	639,753
1954:					
Nov.	43,130	6,839	5,060	1,913	56,942
Dec.	47,356	6,206	4,666	2,068	60,296
1955:					
Jan.	59,043	6,983	3,220	2,099	71,345
Feb.	56,442	6,910	3,727	1,729	68,808
Mar.	65,169	7,132	5,256	2,158	79,715
Apr.	60,826	8,359	5,148	2,534	76,867
May	66,827	7,852	5,115	3,122	82,916
June	65,367	5,919	3,872	3,850	79,008
July	66,827	6,904	5,395	3,700	82,826

Consumption

1946	632,126	44,357	79,228	5,988	761,699
1947	448,589	37,703	68,838	4,536	559,666
1948	345,313	32,118	58,870	5,771	442,072
1949	299,420	31,753	50,855	8,827	414,381
1950	416,230	43,781	66,348	11,930	538,289
1951	626,444	48,887	70,500	13,066	758,897
1952	666,420	55,522	71,229	13,866	807,037
1953	624,181	65,900	77,826	16,929	784,836
1954	500,345	57,203	61,464	17,715	636,727
1954:					
Nov.	46,409	5,276	3,967	1,635	57,287
Dec.	52,475	5,434	4,583	1,638	64,130
1955:					
Jan.	56,371	5,676	4,478	1,854	68,379
Feb.	56,000	5,476	4,312	1,826	67,614
Mar.	63,737	6,423	4,839	2,119	77,118
Apr.	59,746	5,884	4,321	2,095	72,046
May	62,858	6,143	4,455	1,953	75,409
June	65,892	6,320	4,704	2,566	79,482
July	53,321	4,339	3,909	1,656	63,225

Exports

1946	68,763	2,642	495	797	72,697
1947	7,951	2,617	62	755	11,385
1948	1,093	2,875	21	885	4,874
1949	1,401	3,330	178	1,574	6,483
1950	900	4,826	31	1,895	7,652
1951	483	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1954	11,069	12,062	2,831	4,155	30,117
1954:					
Nov.	659	1,081	575	433	2,748
Dec.	994	1,088	140	396	2,618
1955:					
Jan.	1,381	1,046	716	194	3,337
Feb.	1,331	1,049	370	259	3,009
Mar.	2,162	1,287	672	236	4,357
Apr.	1,807	1,636	1,562	506	5,511
May	3,500	1,430	376	357	5,663
June	6,030	1,541	726	389	8,686
July	4,765	1,486	551	373	7,175

Stocks

1946	81,486	10,470	19,478	3,755	115,186
1947	40,606	5,237	13,184	3,339	62,366
1948	96,282	5,072	10,995	2,762	115,111
1949	77,731	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758
1951	105,271	8,379	12,481	3,821	129,912
1952	83,861	8,535	22,716	3,875	118,987
1953	135,153	11,480	24,866	4,346	175,845
1954	115,499	11,349	19,267	4,280	150,395
1954:					
Nov.	121,772	11,429	19,338	4,366	156,905
Dec.	115,499	11,349	19,247	4,080	150,175
1955:					
Jan.	114,976	11,598	17,079	4,160	147,813
Feb.	111,796	10,555	15,424	3,885	141,660
Mar.	113,594	11,037	15,096	3,786	143,513
Apr.	112,156	10,863	14,813	3,586	140,788
May	114,216	10,283	14,449	4,033	142,981
June	108,679	9,755	13,053	3,803	135,320
July	115,772	11,031	13,305	4,811	144,919

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1943	1,890	194	1,512	.....	1,706	3,596
1944	3,090	6,580	4,683	.....	11,263	14,353
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1954:						
July	5,236	2,589	448	643	3,680	8,916
Aug.	7,571	1,995	756	682	3,433	11,004
Sept.	6,480	4,190	676	581	5,447	11,927
Oct.	7,210	5,190	742	780	6,712	13,922
Nov.	6,335	5,115	717	558	6,390	12,725
Dec.	8,888	5,238	729	624	6,591	15,479
1955:						
Jan.	7,853	6,199	617	624	7,440	15,293
Feb.	6,110	5,634	797	641	7,072	13,182
Mar.	7,611	7,078	854	672	8,604	16,215
Apr.	8,550	5,680	975	1,022	7,677	16,527
May	8,849	5,292	880	808	6,980	15,829
June	7,736	4,688	905	1,434	7,027	14,763
July	....	4,753	641	993	6,387	.....

Consumption[1]

1943	9,578	150	1,400	....	1,550	11,128
1944	6,085	6,000	4,400	....	10,400	16,485
1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1954:						
July	4,298	2,587	482	296	3,365	7,663
Aug.	5,228	2,834	561	351	3,746	8,974
Sept.	6,903	3,599	628	379	4,606	11,509
Oct.	7,527	4,347	612	376	5,335	12,862
Nov.	7,622	4,411	631	411	5,453	13,075
Dec.	7,671	4,575	600	460	5,635	13,306
1955:						
Jan.	7,355	4,537	661	506	5,704	13,059
Feb.	7,066	4,881	689	501	6,071	13,137
Mar.	8,415	5,861	828	509	7,198	15,613
Apr.	7,732	5,209	748	601	6,558	14,290
May	6,643	4,728	768	493	5,989	12,632
June	6,589	4,885	722	587	6,194	12,783
July	5,487	3,932	552	404	4,888	10,375

Stocks at End of Period

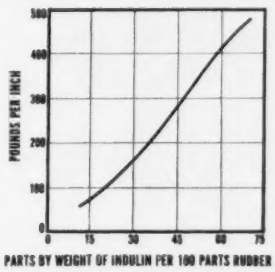
1943	5,638	....	....	....	....	5,638
1944	2,443	....	....	....	....	2,443
1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1954:						
July	10,171	5,363	1,004	831	7,198	17,369
Aug.	12,009	4,220	1,019	993	6,232	18,241
Sept.	11,546	4,504	984	908	6,396	17,942
Oct.	10,952	4,745	1,001	950	6,696	17,648
Nov.	9,759	4,943	1,055	939	6,937	16,696
Dec.	9,933	5,134	1,087	811	7,032	16,965
1955:						
Jan.	9,684	5,861	1,067	812	7,740	17,424
Feb.	8,619	5,753	879	663	7,295	15,914
Mar.	7,820	6,940	909	637	8,486	16,306
Apr.	6,790	7,098	786	703	8,587	15,377
May	8,854	7,021	767	817	8,605	17,459
June	9,788	6,645	817	883	8,335	18,123
July	11,938	6,906	806	1,129	8,841	20,779

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

POLYPOL S-70

for

TENSILE STRENGTH



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Even in conjunction with high loadings of filler pigments, good tensile strength is retained.

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RECLAIMING OILS
PLASTICIZERS
POWDERED RUBBER

Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1954 Production Workers (thousands)	1954 Average Weekly Earnings	1954 Average Weekly Hours	1954 Average Hourly Earnings	1955 Production Workers (thousands)	1955 Average Weekly Earnings	1955 Average Weekly Hours	1955 Average Hourly Earnings
Jan.	203.8	$74.69	38.7	$1.93	208.5	$83.84	41.3	$2.03
Feb.	200.5	75.08	38.9	1.93	209.4	84.25	41.3	2.04
Mar.	196.6	74.31	38.5	1.93	211.6	83.64	41.0	2.04
Apr.	192.4	74.88	38.8	1.93	210.9	86.53	41.8	2.07
May	194.2	77.81	39.7	1.96	216.5	86.94	41.8	2.08
June	195.6	79.60	40.2	1.98	220.0	....	....	....
July	171.0	76.44	39.4	1.94	....	....	....	....
Aug.	174.9	75.85	39.1	1.94	....	....	....	....
Sept.	196.3	77.42	39.3	1.97	....	....	....	....
Oct.	201.6	81.20	40.4	2.01	....	....	....	....
Nov.	202.1	83.02	41.1	2.02	....	....	....	....
Dec.	206.8	84.85	41.8	2.03	....	....	....	....

Tires and Tubes

Jan.	84.5	82.88	37.5	2.21	85.3	97.41	41.1	2.37
Feb.	82.9	83.03	37.4	2.21	86.5	96.46	40.7	2.37
Mar.	81.9	80.99	36.6	2.21	87.4	95.51	40.3	2.37
Apr.	80.4	84.14	37.9	2.22	88.6	102.18	42.4	2.41
May	81.1	88.65	39.4	2.25	90.1	100.91	41.7	2.42
June	82.2	92.06	40.2	2.29	....	....	....	....
July	65.2	87.01	38.5	2.26	....	....	....	....
Aug.	65.9	85.65	37.4	2.29	....	....	....	....
Sept.	82.6	86.18	38.3	2.25	....	....	....	....
Oct.	83.9	90.39	39.3	2.30	....	....	....	....
Nov.	81.2	94.54	40.4	2.34	....	....	....	....
Dec.	84.5	98.18	41.6	2.36	....	....	....	....

Rubber Footwear

Jan.	21.5	62.98	38.4	1.64	22.1	68.97	40.1	1.72
Feb.	20.5	65.57	39.5	1.66	21.5	69.72	40.3	1.73
Mar.	19.6	65.51	39.7	1.65	21.5	69.72	40.3	1.73
Apr.	19.2	63.58	38.3	1.66	21.5	70.82	40.7	1.74
May	19.8	65.46	39.2	1.67	21.3	70.64	40.6	1.74
June	19.8	67.30	40.3	1.67	21.4	....	....	....
July	20.1	68.45	40.5	1.69	....	....	....	....
Aug.	20.5	66.40	40.0	1.66	....	....	....	....
Sept.	21.0	66.08	39.1	1.69	....	....	....	....
Oct.	21.9	71.34	41.0	1.74	....	....	....	....
Nov.	22.3	71.51	41.1	1.74	....	....	....	....
Dec.	22.3	71.69	41.2	1.74	....	....	....	....

All Other Rubber Products

Jan.	97.8	70.62	39.9	1.77	101.1	76.08	41.8	1.82
Feb.	97.1	70.40	40.0	1.76	101.4	76.86	42.0	1.83
Mar.	95.1	70.22	39.9	1.76	102.7	76.49	41.8	1.83
Apr.	92.8	69.30	39.6	1.75	101.0	76.54	41.6	1.84
May	93.3	70.98	40.1	1.77	105.0	78.31	42.1	1.86
June	93.6	70.98	40.1	1.77	....	....	....	....
July	85.7	70.62	39.9	1.77	....	....	....	....
Aug.	88.5	77.15	40.2	1.77	....	....	....	....
Sept.	92.7	72.36	40.2	1.80	....	....	....	....
Oct.	95.8	74.98	41.2	1.82	....	....	....	....
Nov.	98.6	75.71	41.6	1.82	....	....	....	....
Dec.	100.0	76.44	42.0	1.82	....	....	....	....

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1948	1949	1950	1951	1952	1953	1954	1955
Jan.	36.09	33.37	31.89	45.04	42.96	33.24	34.15	35.07
Feb.	33.63	33.41	32.79	(a)	41.64	33.76	35.00	35.04
Mar.	35.04	33.44	32.65	46.06	41.70	34.10	35.23	34.33
Apr.	38.10	33.84	33.23	46.06	41.79	33.85	35.22	34.23
May	38.57	33.73	33.64	46.06	39.98	34.30	35.34	34.80
June	38.12	33.56	34.61	46.06	41.31	34.11	35.17	34.83
July	34.89	32.99	38.11	46.21	40.37	34.20	35.37	34.61
Aug.	32.23	32.06	38.93	35.93	40.42	33.82	35.19	34.53
Sept.	31.92	30.94	41.62	36.20	39.75	33.69	35.46	....
Oct.	32.01	30.32	40.66	38.13	37.52	33.53	35.24	....
Nov.	32.15	30.52	43.11	42.70	35.59	33.60	34.80	....
Dec.	32.90	31.08	43.37	43.32	33.76	33.52	35.03	....
Average for Year	34.64	32.44	37.05	42.43	39.71	33.81	35.10	....

Note: The Government established a ceiling price of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1953	1954	1955		1953	1954	1955
Jan.	132	114	145	July	114	85	...
Feb.	140	114	144	Aug.	122	94	...
Mar.	143	118	146	Sept.	122	118	...
Apr.	140	116	146	Oct.	127	132	...
May	137	118	145	Nov.	120	124	...
June	131	121	150	Dec.	111	128	...

Sales by the Rubber Industry

(in Millions of Dollars*)

	1953	1954	1955		1953	1954	1955
Jan.	434	361	424	July	460	393	...
Feb.	442	360	440	Aug.	424	352	...
Mar.	452	378	466	Sept.	414	346	...
Apr.	443	382	445	Oct.	405	346	...
May	443	378	465	Nov.	360	404	...
June	442	385	...	Dec.	372	417	...

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1953	1954	1955		1953	1954	1955
Jan.	839	835	790	July	901	787	...
Feb.	839	848	782	Aug.	888	754	...
Mar.	854	844	805	Sept.	899	799	...
Apr.	857	813	784	Oct.	878	835	...
May	868	798	810	Nov.	865	811	...
June	893	817	...	Dec.	859	821	...

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1913	113	59	82.04	1934	15 7/8	8 3/4	12.92
1914	93	56	65.33	1935	13 3/4	10 1/2	12.37
1915	79	58 1/2	65.85	1936	23	13 1/2	16.41
1916	102	55	72.50	1937	26 1/2	14	19.39
1917	90	52	72.23	1938	17 1/8	10 1/4	14.64
1918	70	40	60.15	1939	24	14 1/8	17.57
1919	57	38 1/2	48.70	1940	24	18 1/4	20.10
1920	56 1/2	16	36.30	1941	24 7/8	19 1/4	22.40
1921	21 1/4	11 1/2	16.36	1942	22 1/2	22 1/2	22.50
1922	28 3/4	13 3/8	17.50	1943	22 1/2	22 1/2	22.50
1923	37 1/4	24 3/4	29.45	1944	22 1/2	22 1/2	22.50
1924	40 1/8	17 5/8	26.20	1945	22 1/2	22 1/2	22.50
1925	121	34 3/4	72.46	1946	22 1/2	22 1/2	22.50
1926	88 1/2	36 1/4	48.50	1947	25	14	20.00
1927	41 3/4	33	37.72	1948	25	18	21.99
1928	41 1/4	17	22.48	1949	19 3/4	15 7/8	17.57
1929	26 3/8	15 1/2	20.55	1950	86	18	41.10
1930	16 1/2	7 1/2	11.98	1951	76	52	(a)
1931	8 5/8	4 1/4	6.17	1952*	33	26 1/2	29.15
1932	4 3/4	2 1/2	3.49	1953	31 3/4	19 7/8	24.21
1933	9 3/8	2 7/8	5.96	1954	34 1/4	19 1/2	23.61

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

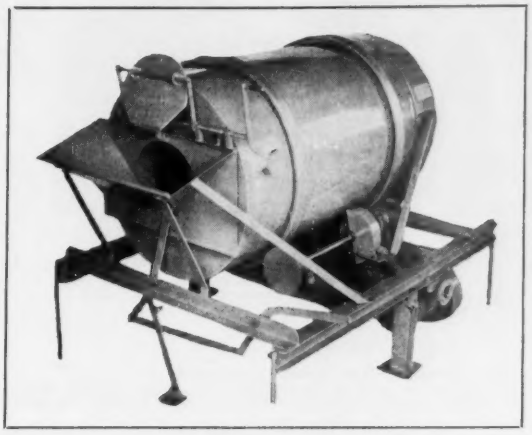
	1948	1949	1950	1951	1952	1953	1954	1955
Jan.	21.83	19.23	18.33	71.21	....	29.40	20.22	33.92
Feb.	20.42	18.49	19.40	73.61	....	27.57	19.98	34.90
Mar.	20.33	19.08	19.86	72.05	....	26.59	20.16	31.08
Apr.	22.87	18.53	23.51	....	....	24.66	22.06	31.75
May	23.39	17.92	28.07	....	....	25.52	21.96	31.35
June	22.80	16.36	30.92	....	....	24.42	23.01	34.74
July	24.24	16.45	39.10	....	30.52	23.64	24.12	40.84
Aug.	23.63	16.60	51.63	....	29.36	23.36	23.26	45.85
Sept.	22.81	17.58	55.98	....	27.42	23.06	23.99	....
Oct.	22.13	16.31	62.19	....	27.26	20.82	26.57	....
Nov.	20.52	16.70	73.05	....	29.25	20.58	28.07	....
Dec.	18.86	17.53	71.20	....	31.26	20.92	29.88	....
Average for Year	21.99	17.57	41.10	(*)	29.15	24.21	23.61	....

Note: (*) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

WILLS "SUB-ZERO"

ROTARY TUMBLERS

THE INDUSTRY STANDARD



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This rubber shop has no problem weight-counting parts. They've switched to new Toteline Tote Boxes that require no maintenance—and so, the tare is constant, within two ounces.

And, these fiberglass-reinforced plastic tote boxes are lightweight, too . . . in fact, they weigh ⅓ as much as the boxes you may now be using. But, lightweight though they are, they are *strong*—in fact, it is almost impossible to wear them out!

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World's largest producers of Fiberglass-reinforced resin trays and tote boxes

LINESVILLE, PENNSYLVANIA IN CANADA: NEWAGE (CANADA) LTD., TORONTO 14, ONT.

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car.	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11 016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car.	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15.832	685
1947 (total) ...	25,056	62,871	3,256	91,183	95.550	6.949
Passenger Car.	19,644	52,857	1.608	74.109	77.795	5.444
Truck and Bus	5,412	10.014	1,648	17,074	17,755	1,505
1948 (total)	26,845	49.148	1,787	77.781	81.314	10,698
Passenger Car.	21,589	41.295	656	63.540	66.738	8.773
Truck and Bus	5.256	7.853	1,132	14.241	14,576	1,925
1949 (total)	31,584	43.466	1,467	76,517	76,369	10.638
Passenger Car.	28,129	36,440	509	65.077	65,140	8.904
Truck and Bus	3,456	7,026	958	11,440	11,228	1.734
1950 (total)	41.349	56,808	1,430	99.587	92.754	3.794
Passenger Car	16.678	47.103	642	84.423	78,598	3.050
Truck and Bus	4,671	9.705	788	15,164	14,156	743
1951 (total)	32.153	44.612	1,677	78,442	83.405	8.765
Passenger Car	26.729	34.226	723	61.678	65,546	6,973
Truck and Bus	5.424	10.386	954	16,764	17,859	1,791
1952 (total)	29.484	54.342	1.520	85,346	90,411	14,110
Passenger Car.	24.106	45.458	741	70,305	74.341	11,251
Truck and Bus	5.378	8.884	779	15.041	16.070	2,859
1953 (total)	37,949	55,124	1,543	94.617	96,150	15.720
Passenger Car	33.106	45.798	809	79,713	81,455	13.044
Truck and Bus	4,843	9.326	734	14,904	14.696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car.	29,741	47,044	928	77,713	76.794	12.217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1954:						
Oct. (total)	1,868	4.251	147	6,266	7,869	12,799
Passenger Car.	1,617	3.423	81	5,121	6,702	10,531
Truck and Bus	251	828	67	1,146	1,167	2,268
Nov. (total)	3,124	3,560	158	6.842	7,626	13.676
Passenger Car.	2,823	2,844	92	5.759	6,480	11,331
Truck and Bus	301	716	67	1,084	1,145	2,345
Dec. (total)	3,707	3,470	169	7,346	8,444	14.774
Passenger Car.	3,383	2,844	88	6,315	7,215	12,228
Truck and Bus	325	625	81	1,031	1,229	2,546
1955:						
Jan. (total)	3,785	4,967	159	8,911	9,040	14,949
Passenger Car.	3,481	4,139	79	7,699	7,797	12,363
Truck and Bus	303	827	81	1,211	1,243	2,586
Feb. (total)	3,833	4,281	157	8.272	8,745	15.368
Passenger Car.	3,540	3,551	83	7,174	7.549	12,687
Truck and Bus	294	730	74	1,098	1.196	2,681
Mar. (total)	4,780	4,926	201	9,907	10.083	15,609
Passenger Car.	4,326	4,254	104	8.685	8,810	12,875
Truck and Bus	454	672	96	1,222	1,273	2,734
Apr. (total)	4,457	5,315	165	9,937	9,153	14,890
Passenger Car.	3,967	4,677	89	8,733	8,000	12,197
Truck and Bus	489	639	76	1.204	1,153	2,692
May (total)	4,352	5,361	152	9,865	9,949	14,936
Passenger Car.	3,871	4,705	87	8,663	8,742	12,235
Truck and Bus	481	656	65	1,202	1,208	2,701
June (total)	3,931	6,129	174	10,234	10,703	15,460
Passenger Car.	3,482	5,399	97	8,979	9,383	12,698
Truck and Bus	449	730	76	1,255	1.320	2,763
July (total)	3,890	5,711	128	9,729	9,027	14,684
Passenger Car.	3,461	4,802	76	8,339	7,893	12.199
Truck and Bus	429	909	51	1,389	1,134	2,485

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total
1935	3,252,244	694,690	3,946,934
1936	3,669,528	781,862	4,451,390
1937	3,915,889	892,382	4,808,271
1938	2,000,985	485,852	2,486,837
1939	2,866,796	704,308	3,571,104
1940	3,692,328	721,637	4,413,965
1941	3,744,500	875,381	4,619,681
1942	220,814	133,083	353,897
1943	0	4,501	4.501
1944	0	124,819	124,819
1954:			
Jan.	454,562	96,167	550.729
Feb.	446,676	87,141	533,817
Mar.	531,529	101,177	632,706
Apr.	534,667	96,723	631,390
May	497,062	91,226	588,288
June	507,055	91,470	598,525
1955:			
Jan.	635,513	89,676	725,189
Feb.	677,705	67,061	744,766
Mar.	791,280	102,992	894,272
Apr.	753,434	127,887	881,321
May	721,139	127,941	849,080
June	647,658	119,215	766,873

Year	Passenger Cars	Trucks	Total
1945	83,792	313,643	397,435
1946	2,148,699	930,760	3,079,459
1947	3,558,178	1,220,634	4,778,812
1948	3,909,270	1,363,856	5,273,126
1949	5,108,841	1,123.736	6,232,577
1950	6,665,836	1,332,263	7,998,099
1951	5,337,729	1,420,432	6,758,161
1952	4,320,794	1,212.790	5,533,584
1953	6,121,787	1,202,196	7.323,983
1954	5,558,897	1,038,045	6,596,942
July	451,663	78,507	530,170
Aug.	445,306	75,835	521,141
Sept.	300,998	68,618	369,616
Oct.	221,195	66,138	287,160
Nov.	498,248	89,232	587,480
Dec.	669,936	95,811	765,747
July	658,736	109,589	768,325
Aug.	.....	.....	.....
Sept.	.....	.....	.....
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1945	5,988	33,906	411	40,304	41.742	3,627
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8.059
1948	26.833	40,548	1,119	68,499	70.033	9,641
1949	31,521	31,450	887	63.858	65,114	10,657
1950	41,240	42.671	811	84,723	80.179	..
1951	32,151	32,284	1.071	65.507	67.249	10.094
1952	29.451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36.072	878	74,907	74.425	11.874
1954	25,071	35,576	945	61,593	48,279	9,519
1954:						
Oct.	429	2,567	92	3,087	3,953	8,313
Nov.	450	2,142	90	2,681	3,246	8,706
Dec.	476	2,019	74	2,569	3,201	9,299
1955:						
Jan.	413	3,629	74	4,116	3,089	8,252
Feb.	352	2,430	80	2,862	2.850	8.244
Mar.	491	2,732	105	3,327	3,234	8,217
Apr.	530	2.635	85	3.250	2,836	7.963
May	531	2,617	84	3,233	3,005	7,735
June	477	3,003	85	3,565	3,136	7,326
July	475	2,915	60	3,450	2,768	6,664

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins							All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,353	22,152	22,823	27,790	22,411	77,478	480.299
1953										
July	4,638	2,821	8,580	3,376	1,507	1,798	2,500	1.859	6.402	33,481
Aug.	4,903	4,609	8.650	3,851	2,063	1,850	2,412	1,721	6,121	36.180
Sept.	5.318	4,855	° 485	4,281	2,073	1,948	2,284	2,000	5,824	38,066
Oct.	5,568	5,081	16,219	4,542	2,279	1,707	2.941	2,049	7,118	41,505
Nov.	4,507	4,126	9.443	3.615	1,447	1,561	2.446	1.755	6.711	35.610
Dec.	4,965	4,579	12.469	4,024	1,549	1,789	3,456	1,721	7,123	41,676
1954										
Jan.	4,869	5.435	10.120	4,638	911	1,614	1,731	1,825	5,988	37.131
Feb.	5,170	5.720	10.711	4,346	1,170	1,829	2.407	2.038	6,712	40,103
Mar.	7,348	6,790	12.255	4,826	1,432	2,029	2,392	2,622	6,127	45,819
Apr.	6,457	6.455	12,568	4,479	1,894	1,864	2.311	2,407	6,325	44,700
May	4,775	3,840	11.096	3,582	3,256	1,730	2.643	2,578	6,010	39,510
June	5,100	3,003	10.529	3,552	3,554	1,916	2.744	2.500	5,343	38.241
July	5,114	3,441	9,648	3,105	3,356	1,859	2.598	1,951	5,010	36,082
Aug.	7,078	4,522	14.541	4,259	3,931	2,198	3.407	2,444	5,804	48.183
Sept.	5,665	4,340	13,454	3,784	3,797	2,242	3,779	2,379	5,768	45,208
Oct.	....	....	....	....	....	....	....	....	....	....
Nov.	....	....	....	....	....	....	....	....	....	....
Dec.	....	....	....	....	....	....	....	....	....	....

Source: Chemical Division, U. S. Tariff Commission.

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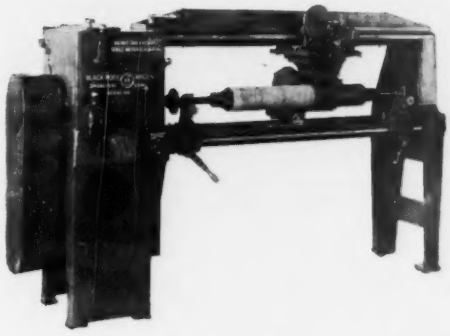

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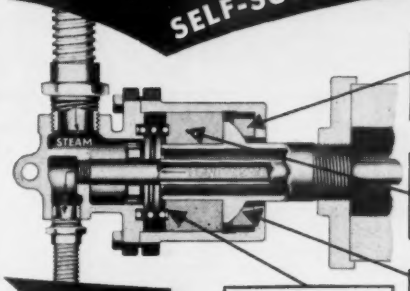

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Various Compounding Materials Consumed by the Rubber Industry

Material	1947	1948	1949	1950	1951	1952	1953
Antimony, Primary:							
Short tons	39	41	55	103[c]	19[c]	66	20
% of total	.002	.003	.005	.007	.001	.004	.001
Asphalt: [a]							
Short tons	32,113	19,967	18,050	26,819	21,414	33,288	.....
% of total	0.7	0.4	0.3	0.3	0.3	0.4	.....
Barite (Barytes):							
Short tons	17,000	18,000	14,000	19,000	15,000	14,000	.....
% of total	3.1	2.85	2.53	3.31	2.13	2.0	.....
Carbon Black:							
Short tons	471,790	435,282	383,565	515,184	530,614	537,273	566,797
% of total	94.3	95.5	93.3	92.9	93.9	93.1	94.4
Clay, Kaolin:							
Short tons	166,201	176,965	197,341	263,306	231,331	240,982	.....
% of total	11.5	11.3	13.1	15.0	12.7	13.2	.....
Clay, Fire & Stoneware:							
Short tons	17,970	15,480	27,148	9,500	.....	9,322	.....
% of total	0.2	0.2	0.3	0.1	.....	0.1	.....
Lime:							
Short tons	589	1,154	715	908	1,126	2,000	.....
% of total	0.01	0.02	.0002	.0002	[d]	[d]	.....
Litharge:							
Short tons	2,205	2,835	1,398	3,047	2,641	2,109	.....
% of total	1.3	1.8	1.2	1.7	1.7	1.5	.....
Lithopone:							
Short tons	3,085	4,192	3,245	4,092	3,295	1,523	1,723
% of total	1.9	3.0	4.1	3.9	3.2	2.5	3.3
Mica, Ground:							
Short tons	3,900	4,372	3,856	5,776	6,551	5,126	.....
% of total	6.0	7.0	7.0	8.0	9.0	7.0	.....
Sulfur:							
Short tons	72,800	70,560	59,360	75,000	75,000	75,000	.....
% of total	1.8	1.7	1.5	1.3	1.6	1.6	.....
Talc: [b]							
Short tons	71,840	66,226	53,400	75,900	70,970	64,476	.....
% of total	13.9	13.0	12.0	12.0	11.2	10.9	.....
Zinc Oxide:							
Short tons	82,248	82,895	58,496	82,944	71,507	72,774	78,439
% of total	51.2	54.9	52.5	51.6	48.4	51.2	52.7

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption—Tons	Consumption—% to Crude [a]	Exports	Stocks On Hand at End of Period
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286.007 [b]	254,820	64.6	30,405	42,532
1943	304.058 [c]	291,082	59 6	15,678	46,201
1944	260.631 [d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366.700	346,121	26.6	14,722	45,082
1952	274.981	280,002	22.2	11,180	30,664
1953	298.336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1954:					
Sept.	22,352	19,926	18.8	641	29,632
Oct.	23,566	22,098	19.3	808	30,395
Nov.	22,986	22,321	20.2	862	29,451
Dec.	25,790	24,546	20.5	816	30,746
1955:					
Jan.	25,336	25,322	20.2	1,041	29,656
Feb.	25,444	24,333	20.5	1,085	30,125
Mar.	29,574	28,674	21.1	1,088	30,311
Apr.	26 817	26,609	21.3	1,088	30,068
May	27,911	27,652	21.2	1,056	29,528
June	30,451	29,157	21.5	1,128	29,725
July	24,051	22,684	20.7	1,092	29,811

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production: Rayon Tire Cord Not Woven	Production: Rayon Tire Cord Woven	Production: Cotton and Nylon Cord & Fabric [a]	Production: Chafer Fabrics (all fibers)	Production: Total Tire Cord and Fabric	Stocks [b]: Cotton and Nylon Cord & Fabric	Stocks [b]: Rayon Cord and Fabric
1954:							
Jan.-Mar.	17,297	73,068	7,905	13,228	111,499	n.a.	n.a.
Apr.-June	15,257	63,975	12,424	12,867	104,523	6,975	56,497
July-Sept.	12,851	50,136	8,858	9,321	81,166	7,321	47,572
Oct.-Dec.	14,609	76,931	13,081	12,476	117,097	7,654	47,061
Total	60,014	264,110	42,268	47,893	414,285	....	....
1955:							
Jan.-Mar.	20,299	79,191	14,870	12,763	127,123	6,863	44,239
Apr.-June	21,550	80,908	18,527	12,728	133,713	8,874	40,566
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1948	1949	1950	1951	1952	1953	1954	1955
Jan.	61,308	63,125	66.981	80.670	86.863	89.634	89.852	96,397
Feb.	56,487	57,980	53.274	72,864	82,043	86.458	86,206	88,464
Mar.	68,171	73,282	78,780	86.962	87.065	98,158	101.549	105,684
Apr.	72,183	75,318	80,350	87,573	98,653	102,044	103,866	111,116
May	77,186	81,665	89,035	100,266	101,137	105,918	104,418	115,407
June	78,044	83,374	90,174	96,364	99,305	114,703	113,037	.....
July	81,428	83,129	91,677	100,567	105,307	112,960	112,231	.....
Aug.	80,351	84,707	94,507	101.453	102,954	109,124	110,223	.....
Sep.	76,159	80,832	86,725	91,891	100,095	106,158	104,706	.....
Oct.	75.164	79,327	89,067	100,209	103,689	106,037	105,607	.....
Nov.	72,560	76,346	82,688	88,581	91,326	99,210	102,393	.....
Dec.	72,162	75,628	81,032	84,551	95,817	100,225	104,258	.....
	871,270	913,713	994,290	1,091,951	1,154,254	1,230,629	1,238,346	.....

Source: U. S. Bureau of Mines.

Rim Production

	1950	1951	1952	1953	1954
Passenger Car	35.096.404	29.145.367	24.936.844	31.318.461	25,952,322
Truck & Bus	6,625.129	6,877.419	5.752.674	5.228.321	4.463,689
Agricultural	2,853.483	3,019.581	2,073,116	1,943.487	1,297.040
Earth Mover	15,602	28,026	31,791	24,685	21,536
Total	44,590,618	39,070,393	32,794,425	38,514,954	31,734,587

	1955: Feb	Mar.	Apr.	May	June	July
Passenger Car	3,060,249	3,919,117	3,829,339	3,503,467	3,308,984	2,654,118
Truck & Bus	415,433	558,758	628,480	695,090	716.348	480,443
Agricultural	155,018	225,915	184,851	201,091	148,454	85,798
Earth Mover	2,124	2,249	3,773	2,293	3,051	3,728
Total	3,632,824	4,706,039	4,646,443	4,401,941	4,176,837	3,224,087

Source: The Tire & Rim Association, Inc.

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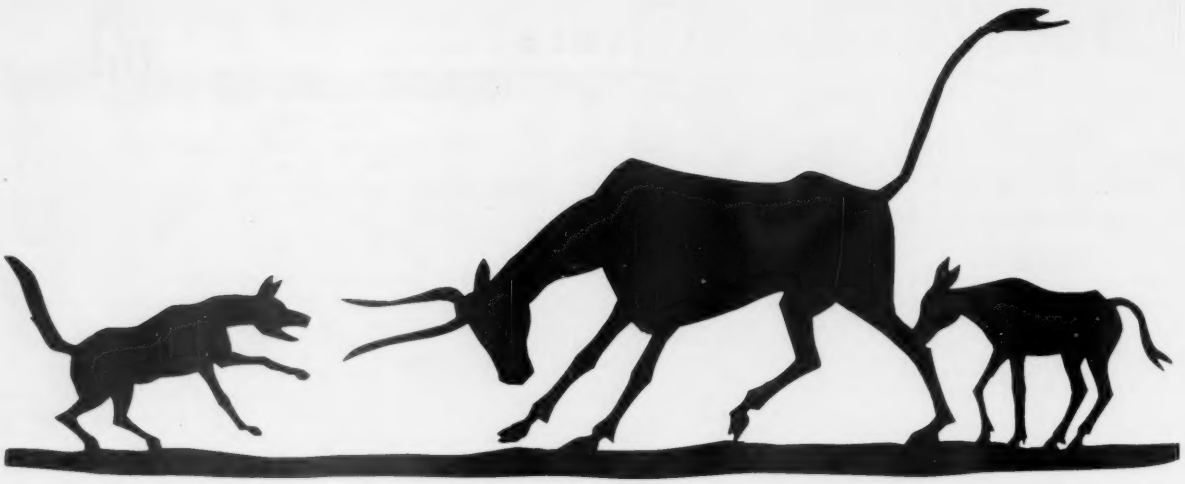

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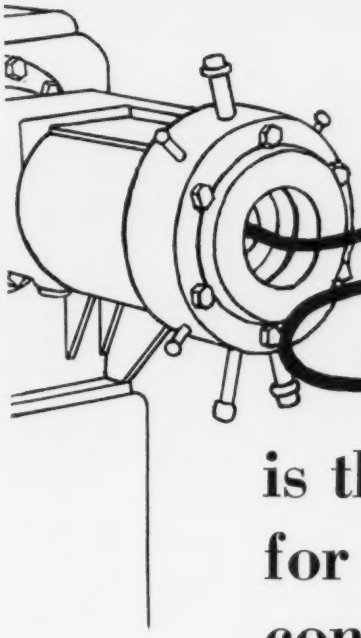

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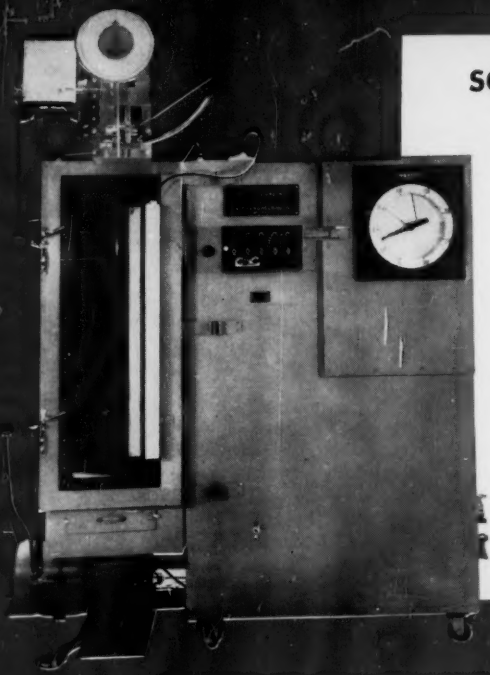
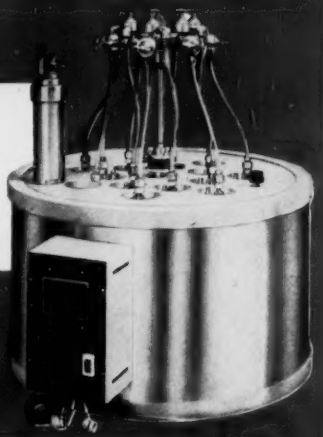


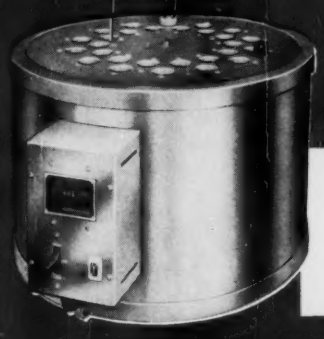
SCOTT MODEL L-8 HOT-COLD TESTER
for tensile tests from −70° to +550°F

Scott Model L-8 incorporates a self-contained conditioning unit with electric heaters, a circulating fan, Brown temperature recorder, control panel for manual operation, refrigeration coils for dry ice cooling which when coupled with the electric heaters and automatic controls allow for temperatures from minus 70° to plus 550°F. The testing instrument itself has an illuminated glass-front enclosure to maintain temperature; or can be operated with door open, at room temperature. If you require elevated temperatures only, in the range up to 300°F., we provide a conditioning cabinet which can be attached to a standard Scott Tester, eliminating the need for purchasing a special model. Model L-8 may be supplied with the "Accr-O-Meter" Electronic Weighing System for constant-rate-of-extension testing.

SCOTT TESTER* MODEL LGP with pressure

Provides 14 individual compartments for pressure ageing in air or oxygen. Individual specimens are isolated to prevent migration. Pressures, temperatures, and ageing mediums are variable to conform with industry practice.





SCOTT TESTER* MODEL LG without pressure

For ageing at temperatures up to 450°C without pressure. Contains individual glass containers suitable for test tube ageing in air similar to ASTM Method D-865-52T for rubber, silicones, and other elastomeric materials. Ideal for swelling test in petroleum, acid, etc.

*Trade mark Complete information upon request.

SCOTT TESTERS, INC., 85 BLACKSTONE ST., PROVIDENCE 5, R. I.

Scott Testers — Standard of the World

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